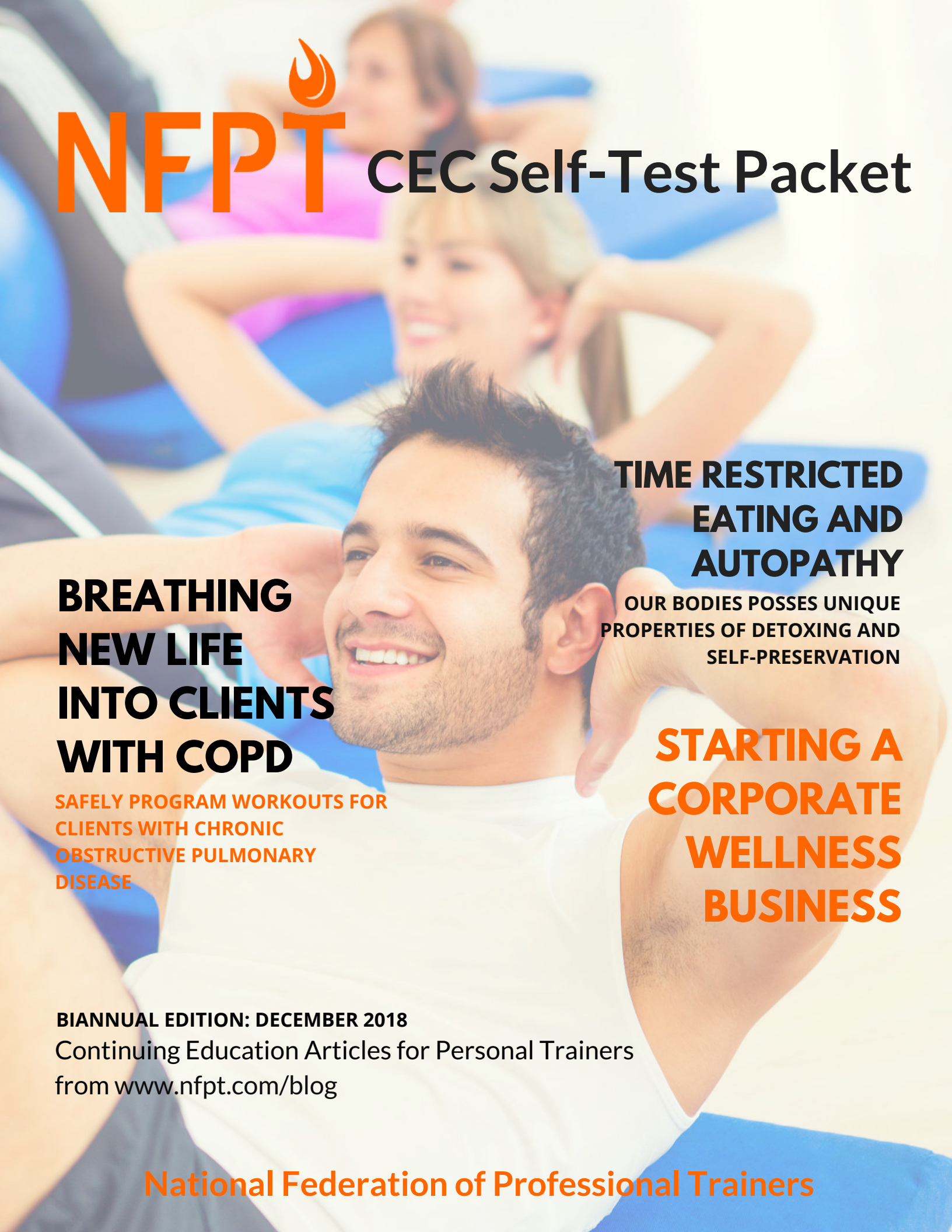

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We thank you for your commitment to the fitness industry and to the NFPT organization of trainers. Please contact us at 800-729-6378 or at info@nfpt.com with any questions, or to just be in touch - we'd love to hear from you! *We wish you continued success in your endeavors!*

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Strength Training for Down Syndrome

Improving muscular strength in special populations is gaining in popularity. Here is your chance to dramatically improve the lives of Down syndrome clients. In a past article, the virtues, and the challenges of training clients with Down syndrome, were addressed. A wide range of topics from program design to cardiovascular regimens as well as improvements in ADL were covered. Now, we delve a bit deeper into the specific area of strength training, and how it may benefit this unique population.

Assessing The Physical Pitfalls

Individuals born with the genetic aberration of Trisomy 21, commonly referred to as Down syndrome, face particular challenges in life of which we may not be aware. Despite the fact that their body shapes tend to be on the stocky side, those living with Down syndrome tend to be lacking in physical power. According to the American College of Sports Medicine, such individuals tend to exhibit 40-50% less strength than their healthier counterparts.

Down Syndrome Exercise Precautions

Armed with this knowledge, we can design a training program for clients living with Down syndrome that is both effective and safe. In addition, there are other considerations to keep in mind before escorting your client onto the gym floor. This special population tends to present with hypermobility, and often finds balance and stability to be a challenge.

Individuals with Trisomy 21 also may suffer from poorly developed respiratory and cardiovascular systems. While each of these aspects might not be evident in every client, your knowledge of the aforementioned possibilities will assist in taking a precautionary approach to fitness protocols.

Exercises for Down Syndrome

Creating a fun and effective training session can challenge us to expand our typical coaching style and our repertoire of exercises. Exercises selection is important, as a negative experience can dissuade these young clients from future participation.

Basic total-body movements, taught with more demonstration and less verbal communication while under constant supervision, are a prudent way to begin. Reinforcing newly acquired skills requires considerable verbal encouragement from us as well, and becomes a key aspect of the all-important rapport we are seeking to create.

A primary goal is to strengthen large muscle groups. Training typically falls into the pattern of 3 sets of 8-12 repetitions, at an intensity of 70-80% of the client's probable 1-rep max. Below are some sample workout ideas.

- Warm-up: bodyweight squats, with a large stability ball placed against the wall and positioned at the mid-to-lower back region.
- Leg presses and leg extensions
- Leg curls
- Lat pull-downs
- Chest press
- Upright rows
- Push-up's (may be performed from the knees)
- Cool-down: walking around a track, followed by a variety of stretches, focusing on the lower body.

If an aerobic burst is to be introduced at the halfway point of the strength training, consider such methods as jogging around a track, up-and-down stepping on a low bench, marching in place, or even 5 minutes on an exercise bike (under supervision).

Cultivating Power

While the exact mechanisms causing this weakness have yet to be fully understood, the good news is that through proper and careful training, professionals have been successful at increasing muscular strength in this demographic while also demonstrating gains in other areas of fitness and wellness.

A research study was conducted on 12 test subjects ranging in age from 18 to 36 years, and comprised of 7 females and 5 males. Over the course of 10 weeks, the participants engaged in a protocol involving 6 strength-based exercises; each exercise was performed with 3 sets of 10 repetitions. The exercise sessions took place twice a week.

At the end of the 10-week trial, a significant improvement in strength was observed. The 3 upper-body exercises revealed an average increase of 42%, while strength gains attributed to the 3 lower-body exercises averaged a 90% uptick.

Real-Life Work Translates To Real-Life Gains

Another study utilized test subjects as well as a control group. For this 10-week trial, the active individuals engaged twice a week in a progressive resistance- training regimen at a local gym. The control group participated in a weekly 90-minute social program, which consisted of purely recreational activities.

The researchers were interested in 2 skill sets: work task performance and muscle strength/physical activity level. The work task performance assessment consisted of weighted box stacking and weighted pail carrying. Muscle strength/physical activity was measured with an RT3 activity monitor, a device used to assess the amount of energy expended during periods of activity and rest. At the end of the trial, the activity-based participants had significantly increased muscular strength in both their upper and lower limbs.

Body weight and flexibility remained essentially unchanged for the participating Down syndrome individuals over the course of these 10-week experiments. However, flexibility is a unique parameter and is best addressed and improved upon through methods other than pure resistance training.

Building Self-Esteem Along With Strength

The good news does not seem to be limited to gains within the physical realm. Down syndrome adults who participate in a professionally supervised fitness-based education program have been able to successfully alter their attitudes towards exercise. This result seems to correlate strongly with positive expected outcomes, fewer cognitive-emotional barriers, and an overall improved outlook on life.

Self-efficacy is definitely at play here, enhancing our goal of increasing participation of clients with unique and specialized needs. Once again, the role of the personal trainer deserves to be acknowledged and recognized. Our challenge remains in effectively promoting such research with the hope of raising awareness of the virtues of strength training within this community.

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Why You Should be Training Senior Adults

Regardless of their level of education, many seniors struggle to get into a regular habit of physical exercise, leaving them in less than ideal health. As personal trainers, we must strive to find ways of engaging this population, and it seems as if spreading the news of how exercise helps the brain as well as the body might be a great place to start.

Let's Get Physical

The most commonly discussed reason for exercise participation is for purposes of weight loss and/or maintenance. Since metabolism rates seem to wane with age, becoming more active can boost metabolism, as can the addition of lean muscle mass.

Another benefit relates more to general wellbeing as we age. The ability to enhance mobility, strength, posture, flexibility, and balance are all by-products of an active lifestyle.

Lesser-known results, but impressive still, are the improvements exercise can make in digestive and immune system function, blood pressure and bone density. Research has indicated that regular exercise, most notably in the senior population, may confer some protection against diabetes, obesity, heart disease, osteoporosis and certain select types of cancer.

Mental Health Benefits

Group exercise instructors and personal trainers love to see their participants and clients becoming engaged in activity, but just as important is witnessing the smiles on their faces as they see and feel improvements in their health.

Such emotional uplifting is a big reason to encourage older adults to get moving. Exercise offers an opportunity to relieve stress, and the resulting endorphins often help reduce feelings of sadness, depression, or anxiety.

While regular moderate exercise may cause fatigue, the good news is that sleep patterns are greatly improved. Active seniors report fewer bouts of insomnia and more restful shut-eye time.

Perhaps one of the unexpected benefits of being more active occurs in the brain. By adapting to new movement patterns, exercise helps brain functions such as multitasking and creativity. Of particular importance to this population is the evidence that exercise can help prevent memory loss, cognitive decline, and dementia.

Exercise programs in particular that are structured, individualized, of a significant intensity and duration, and include varied components show promise for preserving cognitive performance in older adults.

Population Growth Means More Client Potential

In the United States, the number of individuals aged 65 years or older is expected to more than double by the year 2060, from 43 million to 92 million. Concurrently we can expect to see a rise in the prevalence of dementia and other cognitive impairment.

Although declines in cognition attributed to the normal aging process are well documented, some of the changes observed in brain structure and function may be related to neurodegenerative diseases such as Alzheimer's and other types of dementia. Surveys indicate that approximately 14% of individuals over the age of 71 in this country alone suffer some form of dementia.

Physical exercise that targets modifiable risk factors may reduce declines in cognitive performance and protect against neurodegenerative changes. Engaging in any form of moderate aerobic exercise is especially important for seniors with co-morbid illnesses.

Exercise can lessen fatigue and shortness of breath, benefits which in turn help to foster independence by improving endurance for daily activities.

Research studies consistently demonstrate that strength training that has the most significant impact on improving the quality of life for our aging population. The use of weights helps prevent loss of bone mass, builds muscle, and improves balance, all of which go a long way towards staying active and avoiding falls.

Senior adults who undergo progressive resistance training programs have shown marked improvements in the execution of complex activities coupled with a decrease in functional impairments.

Physical Activity Recommendations for the Elderly

The Center for Disease Control (CDC) includes a Division of Nutrition, Physical Activity, and Obesity. These professionals have created basic guidelines for adults over 65 who are reasonably fit and have no limiting health conditions. Any of the following protocols can be beneficial:

- 2 ½ hours of moderate-intensity aerobic activity per week paired with strength training on two or more days of the week. Such progressive resistance training targets all major muscle groups (legs, hips, back, abdomen, chest, shoulders, arms)
- 1 ¼ hours of vigorous intensity(jogging/running) aerobic activity per week coupled with the aforementioned weight training
- An equivalent mix of moderate and vigorous intensity of aerobic activity per week AND the same 2x/week strength training program

While these guidelines for older adults may be overwhelming at first, particularly for new clients and relatively deconditioned senior adults, they can be goals towards which to build gradually. If in consulting with a potential client, you sense ambivalence in motivation, there are many ways to creatively engage this population. Consider the following:

- **Verbalize and explain the benefits**— Many older adults to whom physical exercise is a new concept may not fully grasp all that is to be gained by such a lifestyle change.
- **Become a personal motivator** — This may be a challenge, but it is part of the requirement when working with the senior population. Certainly, trainers incorporate varied exercises during one-on-one sessions. However, also consider discussing different types of physical activity to replace or counteract more sedentary television time.
- **Use technology**— Fitness trackers and Smartphones are appealing to many tech-savvy older adults and can prompt motivation. Often a basic pedometer is all that is required to spur a hesitant client into action.

Trainers possess all the skills necessary to positively impact the lives of seniors. Seek out ways within your own community to spread this information, and build your client base with this burgeoning demographic.

Stay tuned for Part 2 - Exercise Programming for Senior Populations, where we will discuss specific exercises to enhance the lives of your senior clients!

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Training Tips for a Client's Triathlon

Calling all Cyclists, Swimmers, and Runners ~ If your client is seeking some challenging competition, it may be time to "try a tri"!!!

Excelling at any sport requires a tremendous amount of effort, time and training. I marvel at those individuals (such as my husband) who can carve out adequate space in their busy lives to excel at *three sports* at the same time.

'Tis The Season

Triathlons have come a long way since their inception in 1974, when 46 people competed in the inaugural swim/bike/run race held in San Diego, CA. To date, more than 2 million individuals of all ability levels participate in triathlons every year.

Now that summer has arrived, clients may begin soliciting your advice on the most effective way to prepare for a triathlon. Such a training module must include biking, swimming and running, but also encompass specific resistance training.

Clients who have never challenged themselves to complete a triathlon have many choices to make. Competitive options abound, and helping them decide on an appropriate race requires a bit of knowledge about this sport.

What Does a Triathlon Include?

Most novices choose to participate in a Sprint Triathlon. Such a contest typically begins with a 0.5-mile swim, 12.4 miles on a bike, and concludes with a 3.1-mile run.

The next level up is referred to as an Olympic Triathlon, which includes a 0.93-mile swim, a 24.8-mile bicycle ride, and a 6.2-mile run.

If your client happens to be a seasoned athlete and wishes to truly dedicate serious time to his training and building his competitive edge, you might suggest choosing a Half Ironman Triathlon. Not for the faint of heart, participants swim 1.2 miles, bike 56 miles, and end by running 13.1 miles.

The most highly coveted honor that many endurance athletes seek is participation in the famous Ironman Triathlon: 2.4 miles of swimming, 112 miles of biking, and 26.2 miles of running.

An important factor to keep in mind is the lengthy preparation time involved before even arriving at the starting line of an event. For a newcomer to the sport, most experts agree that 12-16 weeks of active training is probably sufficient.

Such workout programs do not always involve working harder; by preparing in a smarter fashion, you can help your client make the most of this time. Consider intensity versus duration.

The Specifics of Tri Training

Prudent triathlon preparation includes 2x/week participation in each activity. Build in what is known as a "brick session", training 2 of the 3 activities back-to-back. Seek also to practice swimming in an open body of water in addition to a swimming pool; many triathlon organizers have had to make such a switch at the last minute.

The goal throughout this training protocol is to slowly build endurance by lengthening distances. Aiming for a 10% increase each week is a safe pace. By the time race day arrives, the athlete hopefully is capable of completing at least

10% more in each sport that the total race distance. Having built such a buffer into the training serves as a “comfort zone” for many.

Stressing Strength

While the endurance aspect of a triathlon is not to be minimized, resistance training becomes a valuable tool in preparing the body for the competition that lies ahead. Planning a program requires a bit of mechanical knowledge of how the body is challenged when performing each sport.

Muscular strength, as well as stability, will contribute greatly to a client’s performance. A smart protocol aims to enhance strength in most of the major muscle groups. Swim training focuses on the back, shoulders, and arms as well as seeking to create mobility in the trunk. Both cycling and running require strengthening quads, glutes and hamstrings.

Client Commitment

The following exercises are prime examples of what might be included to cultivate the strength required to triumph in a triathlon: overhead squats, Romanian deadlifts with upright rows, split squats, planks, and push-up’s that place emphasis on the triceps.

If your eager client embarks on this journey truly deconditioned, a few extra weeks of preparation time may be essential. Keep in mind that his body will need time to build his bone density, strengthen joints, and challenge muscle tissue that has been lying dormant.

These adaptations cannot occur overnight. Cells require time to create all new enzymatic/metabolic pathways and energy systems. It is at this juncture where a bond of client/trainer trust begins to play an important role.

Sore muscles and fatigue often threaten to become discouraging elements for novice triathletes. Building in one or two rest days each week will facilitate healthy recovery. While you remain certain that your client will soon witness the transformation and feels the results, he may lack such confidence. By staying positive, you can encourage him to keep going and not allow his momentum to lag.

Encourage With Confidence

According to Adam Kelinson, a recreational triathlete, a nutritionist specializing in sports performance, and author of *The Athlete's Plate Real Food for High Performance*, a participant may discover that he is strong in one or two of the triathlon’s sports, but needs work in the third endeavor.

You can remind him that strength in a particular sport never makes up for weakness in another. Imparting such knowledge will enable him to train harder on exercises that no doubt are not his favorite.

Once you have laid out a 12 or 16-week plan for the client, he will also appreciate any practical tips you can offer. Aside from the obvious suggestions of well-fitting swim goggles, practicing cycling outdoors as often as possible, and running in high-quality footwear, here are a few other tips that a novice athlete may find valuable.

Swimming requires mastering the coordination of breathing with stroking, not only to accomplish this first leg of the triathlon, but also to keep the swim efficient so there is ample energy left in the body for the bike ride and the run.

Cycling becomes highly effective when the bike is custom-fitted to the client’s body size. While this might be a slightly expensive endeavor, reassure your client that the results will be worth this investment.

Endurance running necessitates a proper stride cadence. By leaning slightly forward through the chest, keeping elbows at an approximate 90-degree angle and not tensing the arms, a comfortable pace can be established.

Proper Fuel and Hydration

If temperatures on race day are expected to creep into the 80's or 90's, placing considerable emphasis on hydration could mean the difference between your client crossing the finish line or collapsing at the mid-point. Beverages that contain added electrolytes or vitamins provide a significant boost in energy. In terms of fuel, encourage a meal plan that is rich in both lean protein and complex carbohydrates.

Above All, Find The Fun

One of my clients challenged me to step out of my comfort box (bodybuilding and teaching group exercise) and join her in a 5K. Having not run prior to accepting her offer, I found that cultivating new abilities is most empowering! She, too, was proud of our time at the finish line. Be ready to share in your client's success! You never know when YOU might decide to "*try a tri"!*

Check out this article for exercise ideas for runners and cyclists.

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Can Exercise Help Peripheral Neuropathy?

The right exercises can be a catalyst for regaining motor control in clients sidelined with neuropathic pain. Negotiating with neuropathy when personal training has its challenges, but you can make movement possible again.

Peripheral neuropathy is a widespread and potentially incapacitating pathological condition that encompasses over 100 different forms of nerve damage. An estimated 20 million people in the United States suffer from its deleterious effects: weakness, numbness, and pain, most commonly in the hands and feet.

Menacing Manifestation

Risk factors for developing peripheral neuropathy include the following:

- Diabetes mellitus/poorly controlled blood sugar levels
- Alcohol abuse
- Vitamin B deficiency
- Infections such as Lyme disease, shingles, hepatitis C and HIV
- Autoimmune diseases such as rheumatoid arthritis and lupus
- Kidney/liver/thyroid disorders
- Overexposure to toxins
- Repetitive motion tasks
- Family history of neuropathy

Although symptoms will vary from patient to patient, individuals living with peripheral neuropathy generally exhibit a few classic characteristics:

- Gradual onset of numbness, prickling or tingling in hands/feet, occasionally spreading into arms/legs
- Sharp/ throbbing/ freezing/ burning pain
- Extreme sensitivity to touch
- Lack of coordination/clumsiness
- Muscle weakness or paralysis
- Loss of balance
- Dizziness upon standing
- Sexual dysfunction

Often worse at night, neuropathic pain is further exacerbated by disruptive sleep patterns. Coupled with an over-sensitization of pain receptors in the skin, patients often report feeling severe pain from seemingly innocuous stimuli, such as bed sheets draped lightly over the body.

How Neuropathy Develops

The human body's peripheral nervous system sends information from the brain and spinal cord to the rest of the body, most notably to the muscles in an effort to generate movement.

Peripheral nerves also send sensory messages back to the central nervous system. Similar to static on a telephone line, peripheral neuropathy distorts and may even interrupt this process.

Large sensory fibers register vibration and positional awareness. Damage to these fibers results in a general decrease of sensation, which patients liken to wearing gloves and stockings, as well as diminished reflex response.

Positional awareness challenges often render complex movements like walking, fastening buttons, or maintaining balance frustrating and difficult.

Small sensory fibers transmit pain and temperature sensations. Patients suffering from damage in this area of the nervous system may fail to perceive an injury such as a cut or an infected wound.

Others may not detect pain that warns of impending heart attack or other acute conditions. Loss of such sensation is a particularly serious problem for individuals with diabetes, contributing to the high rate of leg/foot amputations among this population.

Autonomic nerve damage symptoms are diverse since the parasympathetic and sympathetic nerves control nearly every organ in the body. Commonly experienced problems include an inability to sweat normally, which may lead to heat intolerance; a loss of bladder control; and an inability to control muscles that expand or contract blood vessels as they strive to regulate blood pressure.

A drop in blood pressure upon rising (a condition known as postural or orthostatic hypotension) may result in dizziness or fainting.

Can Exercise Help or Hinder?

The adoption of healthy lifestyle habits can reduce the effects of peripheral neuropathy. A balanced diet, smoking cessation, and regular exercise are all helpful.

Since many underlying causes of peripheral neuropathy cannot be fully treated, it is critical to understand that routine exercise may not only help prevent some of those causes but has also proven to be an effective means of alleviating some of the condition's most distressing symptoms.

Paying close attention to foot care and wounds, especially when pain sensation has been greatly diminished, can greatly improve one's quality of life. Such changes often create conditions that may even encourage nerve regeneration.

Cultivating Cardio/Strength/Balance

Research has shown that strengthening exercises for peripheral neuropathy lead to a moderate improvement in muscle mass along with a decrease in atrophy. In addition, properly chosen exercises may reduce cramping and can help control blood sugar levels. A comprehensive exercise routine should include four kinds of activities: *aerobic, flexibility, balance and strength training*.

In addition to what we can offer clients through personal training, physical and occupational therapy can help to improve balance and gait, fine motor skills, dexterity, and coordination.

Balance/ proprioceptive exercises challenge the receptors in the toes, ankle, and feet to send signals back to the spine. By encouraging the body to pay more attention to these receptors, tripping and falling will dissipate over time.

The more information the body receives from the joints at receptors, the more it becomes accustomed to these signals, and an improved stabilizing response develops.

Some of the activities that can be encouraged for those suffering from neuropathy include stationary cycling, semi-recumbent cycling, and water exercises. Water activities and semi-recumbent cycling are especially beneficial for those with orthostatic hypotension, since the pressure of water surrounding the body as well as the semi-recumbent posture help to maintain blood pressure.

Chair exercises are also beneficial: seated ankle circles performed while extending 1 leg at a time, and performing circles both clockwise and counter-clockwise, are easily tolerated by even the weakest of clients.

Researchers note that yoga is also helpful in reducing stress levels, blood pressure, and inflammation, all of which can affect the progression of diabetes-related neuropathy. Although yoga might feel less intense compared with cycling or strength training, it still gets the heart pumping and can facilitate the building of lean muscle mass.

Such exercises increase the supply of blood, oxygen, and glucose going to the cells' mitochondria, allowing the production of energy in a more efficient manner. Facilitating blood flow to peripheral nerves may result in fewer neuropathic symptoms, increased strength, and improved balance.

Duration

Patients with clinically significant autonomic neuropathy typically demonstrate a lower exercise tolerance, resulting in large part from the reduced cardiac output and faulty redistribution of blood flow to the muscles.

Consequently, the duration of exercise in these clients must be determined individually. A workout may initially be tolerated for less than 30 minutes; advise clients not to increase the intensity of the exercise to compensate for a shorter session. Over time, comfort levels will allow for longer workouts.

The Role of Cancer

Chemotherapy-induced peripheral neuropathy (CIPN) is an under-addressed problem in the field of oncology. If nerves in the hands are affected, clients may have difficulty grasping dumbbells. Tubing or resistance bands with handles may be a safer, more effective option.

Peripheral neuropathy may develop at any phase of one's cancer journey. A new study revealed that 50% of women who have undergone chemotherapy report symptoms of peripheral neuropathy long after their treatment has ended, and often present with a significantly higher incidence of altered walking patterns.

"Women with peripheral neuropathy reported significantly lower physical functioning, significantly more difficulty with tasks of daily living, and increased fall risks" says the study's lead author, Kerri Winters-Stone.

Understanding the process and side effects of peripheral neuropathy can allow us to better serve our clients. We can offer them the chance to regain movement that they may have thought to be permanently lost. Together you can face this challenge head-on and witness the magnificent life-affirming transition.

Have you worked with a client dealing with chemotherapy-induced peripheral neuropathy?

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Meniscus Anatomy and Injuries

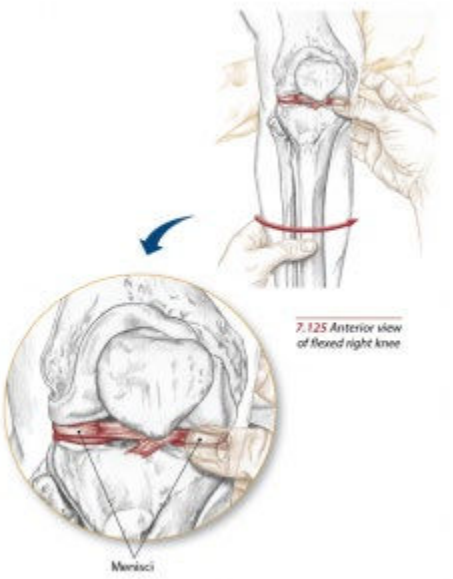
As a fitness trainer or coach, you will undoubtedly have to create an exercise program around aching knees for many of your clients because a large percent of the world's population has or will have a knee problem.

Here are some of the most common injuries that affect the majority of the population; whether stemming from lack of conditioning, overtraining or simply a bad move.

What does the meniscus do?

The menisci literally get caught between the knee bones during exercise and sports movements and sometimes torn when twisted too far. Knowing about these structures helps you choose biomechanically appropriate exercises for clients and keep them safe while moving on your watch.

The menisci are two, 'C'-shaped hybrid types of cartilage that act as the shock absorption system of the knee. The menisci help distribute stresses over a broad area of articular cartilage, absorb shock during dynamic loading, and help with joint lubrication.



Unlike articular cartilage which is predominantly composed of Type 2 collagen in the organic matrix, menisci tissue is made up of the same coarse Type 1 collagen organic matrix found in tendons and ligaments, giving the meniscus the great tensile stiffness it exhibits.

Without the menisci, the daily stress of walking and the compounded effect of running, jumping, and weightlifting would be impossible. The menisci offer the additional protection to the articular cartilage covering the ends of the femur and tibia while simultaneously aiding in the lubrication of all the internal components of the knee.

What causes a meniscus tear?

A torn meniscus is generally caused by one of two things; acute trauma or degeneration of the knee joint. Acute trauma is the type of injury caused by physical activity in which the knee is subjected to constant forceful blows. This is common in activities such as football, rugby, baseball, soccer, basketball and racquet sports.

Other types of acute trauma injuries are also common in activities of daily living. For example, if the knee is rotated forcefully while the foot is firmly planted on the floor while bearing weight, the meniscus can become injured.

Other causes for a meniscus tear are Hyperflexion or Hyperextension, which can happen during a car accident or other low impact activities if the knee is unstable. The most common mechanism of injury is non-contact stress from deceleration or acceleration coupled with a change in direction (cutting maneuver).

Joint Degeneration (Osteoarthritis), or wear and tear, is the most common form of arthritis, affecting at least 20 million people worldwide. Sparing no race, age or gender, Osteoarthritis sets in when the cartilage that covers the ends of the femur, tibia, fibula, and patella deteriorates over time. Eventually, when the cartilage breaks down you are left with bone rubbing on bone, which is usually accompanied by an overgrowth of bone (osteophytes). This in turn narrows the joint space and places even higher compressive forces on the meniscus, leading to a tear.

Types of Meniscus Tears

Meniscus tears are classified by how they look as well as where the tear occurs.

Longitudinal Tears are the most common variety usually occurring at the back or the inner cartilage and are common in young adults during sports activities. The injured person can generally pinpoint the incident with three factors being present. The knee was flexed while bearing weight and then twisted.

Bucket Handle Tears are tears around the rim of the meniscus causing the central portion to displace into the joint. It is commonly referred to as an exaggerated form of a longitudinal tear where a portion of the meniscus detaches from the tibia, forming a flap that looks like a bucket handle.

Flap Tears have a loose medial flap along a horizontal plane that tends to flick over from time to time causing symptoms. They can occur as an acute tear or as a progression from longitudinal tears.

Transverse Tears also referred to as radial tears can be small where only a portion of the meniscus is torn generally radiating from the inside to the outer menisci or large where the tear reaches almost to the outer portion.

Torn Horn Tears also referred to as Parrot Tears, are commonly found in the posterior horn (tip) of the meniscus, specifically the posterior inner aspect that's more toward the center of the knee joint. A forceful blow or twist such as pivoting during physical activity is the most common cause for a Horn Tear.

Common Symptoms of Meniscus Injuries

A meniscus injury can make itself known in various ways. Sometimes the injured person experiences a "popping" sensation during an athletic event. It is important to note though that while tears are more commonly seen in athletes or those with demanding occupations where the knee is constantly at risk, they can also occur with seemingly innocuous activities such as jogging or squatting.

There is usually significant pain along the joint on the side of the injury while some tear patterns will cause a portion of the torn menisci to be trapped between the joint causing the knee to lock where extension and flexion are impossible.

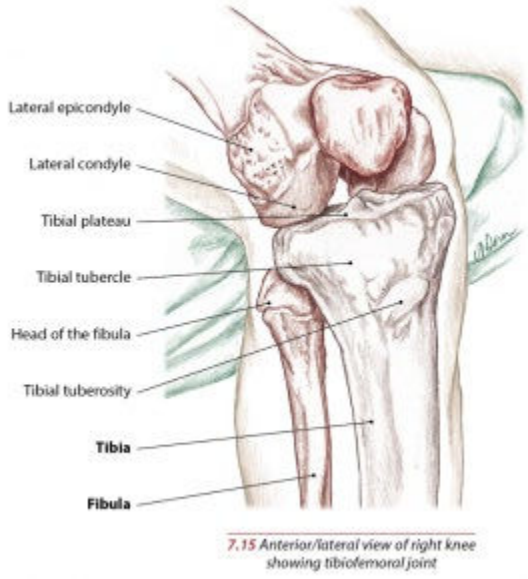
The following are common signs of meniscus injury:

- Pain
- Swelling
- Inability to fully extend or flex the knee without discomfort
- Locking or catching of the knee
- Weakness of the quadriceps evident when walking up or down stairs
- Continued popping, locking or buckling

Meniscus injuries are common and important to know about so you that you program knee exercises accordingly and communicate with your clients health practitioner.

Knee Anatomy Structure and Injuries

Knee pain and complaints are common amongst fitness clients. A clear understanding of the internal knee and knee function supports knowledge for restorative knee exercise programming, progressions, and regressions.



7.15 Anterior/lateral view of right knee showing tibiofemoral joint

The knee is the junction of the femur, tibia, fibula, and patella bones. Ligaments, tendons, fascia, and muscle connect the joint and allow movement.

Technically named a synovial joint, the knee is more specifically referred to as a "hinge" joint for it's linear and door like movement patterns. When the knee is flexed it can, in fact, perform internal and external rotation!

The knee joint has four ligaments along with the menisci, a type of hybrid cartilage/ligament that acts as a shock-absorbing barrier between the articular cartilage on the ends of the femur and tibia.

Lateral Collateral Ligament (LCL)

The LCL is also called the "fibular collateral ligament" because it connects the lateral femur and fibula. LCL limits the sideways motion of the knee. Any hyper or excessive movement in which the knee has to over stabilize against a sudden change of direction that the surrounding musculature can't control could damage this ligament.

Medial Collateral Ligament (MCL)

The MCL is also called the "tibular collateral ligament" because its attachment sites connect the medial femur and tibia. Like the LCL, the MCL limits the sideways motion of the knee and is generally injured when the stress of quickly changing directions overpowers the force and stabilizing abilities of the surrounding musculature.

LCL and MCL Causes of Injury

Anytime the knee is subject to sideways motion the LCL and MCL are prone to injury. Sports like racquetball, tennis, basketball, football, and soccer are places for potential injury. Also, stepping out of a car, bumping a corner in a grocery store aisle, or missing a step while walking can place lateral-medial stress on the knee.

MCL Sprain or Tear

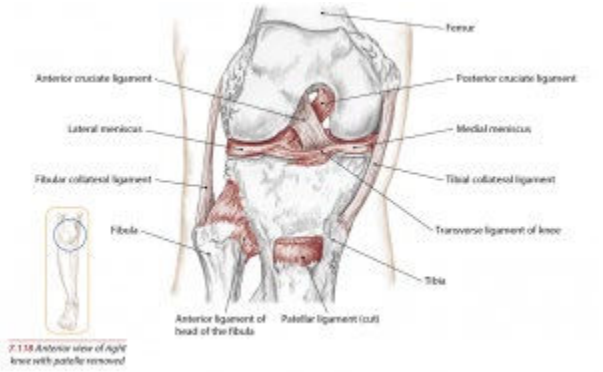
MCL injuries occur when the knee is struck on the lateral part (Outside) of the body. Since the MCL is located in the inside part (Medial) of the knee and resists widening of the inside of the knee joint when the knee is struck from the outside with a force that causes lateral buckling it simultaneously separates and widens the medial portion of the knee joint causing the injury.

MCL tears are classified by their severity into three categories.

- Grade 1- This is an incomplete tear of the MCL. The tendon is still in continuity and there are minimal symptoms. The symptoms are pain on the MCL with minimal downtime where most can return to their normal activities or sports within a few weeks' time
- Grade 2- A grade two tear is also an incomplete tear but with more aggravated symptoms such as more intense swelling and pain along with a feeling of instability. A period of at least three to four weeks of rest is usually necessary.
- Grade 3- This is a complete tear of the MCL. There is significant swelling and pain with difficulty bending the knee. Instability or the knee giving out are common findings. A period of at least six weeks or longer is needed for healing to occur. Having a knee brace with lateral and medial stabilizers is recommended. Due to the good blood supply that the MCL has and usually responds well to non-surgical treatments, it is rarely treated with surgery.

LCL Sprain or Tear

LCL injuries are the complete opposite of MCL tears. They occur when the inside (medial part) of the knee is struck and pushed out or in sports where there are a lot of quick stops and turns as in soccer, basketball and skiing. LCL injuries are also classified by their severity with the classifications and symptoms similar to those of the MCL. However, the LCL does not heal as well as the MCL and in most cases a Grade 3 injury will require surgery.



Anterior Cruciate Ligament (ACL)

The word "cruciate" means crossing from one side to the other and/or one over the other. The ACL connects the femur to the tibia along the front center part of the knee. Specifically, one end connects to the anterior tibia along the medial side of the tibias' sagittal line.

The other end connects to the deep portion (almost to the rear but not quite) of the femur along the lateral side of the femur's sagittal line. If you look carefully you can identify a slight diagonal angle to this ligament.

The ACL, one of the most common ligaments injured in sports, is responsible for controlling the allowable rotation of the knee along with limiting the forward trajection of the tibia under the femur during, but not limited to, squatting, lunging, landing, running, and walking.

The ACL is most commonly injured quick rotational movements where the foot is planted but the upper body is changing directions in a rotational fashion. Imagine a basketball player coming down from a rebound and accelerating with the upper torso in a direction opposite to how the feet are grounded without pivoting. Ouch!

Posterior Cruciate Ligament (PCL)

The PCL is the strongest ligament and primary stabilizer of the knee, also connecting the femur to the tibia but through the posterior side. The PCL limits the backward motion of the knee and may also prevent medial-lateral (side-to-side) and rotary movements.

Another injury prone example would be someone washing dishes with both feet grounded and abruptly twisting the upper torso, hips, and femur in directions opposite to those in which the feet are facing without allowing for a slight pivot or complete re-positioning of the foot.

ACL Sprain or Tear

An ACL tear is most often a sports related injury but can also occur during rough play, auto accidents, falls and work related injuries. Most ACL injuries in sports happen when pivoting or landing from a jump. Similar to meniscus injuries, patients of ACL tears often feel a "pop" and the knee usually gives out underneath them.

Subsequent pain and swelling is to be expected. ACL tears do not necessarily require surgery. According to Doctor Jonathan Cluett, Board Certified Orthopedic Surgeon in Massachusetts, your daily activities and demands should be considered prior to opting for surgery.

For instance, do you regularly perform activities such as football, soccer, basketball, skiing, gymnastics, hockey, wrestling, lacrosse, rugby, singles tennis or cheerleading that require a normally functioning ACL? Secondly, is your knee stable? If not, you may not need ACL surgery. Many patients with ACL injuries feel better within a few weeks. The only persistent problem may be instability.

PCL Sprain or Tear

PCL injuries are most commonly experienced when the knee is bent and an object forcefully strikes the shin backwards. This type of injury can be experienced in a car collision when the shin strikes the dashboard. The other mechanism of injuring the PCL is in sports when an athlete falls on the front of the knee. The knee is hyperflexed with the foot held in a pointing downwards position. Symptoms of PCL injuries are quite similar to those of ACL injuries. In the weeks following the injury patients state that they can't trust their knee or that it feels as it is going to give out.

Knee Cartilage

Cartilage, sometimes referred to as "articular cartilage", can be found at the end of the fibula, tibia, fibula, and behind the patella. Cartilage is a type of connective tissue that has no blood vessels or lymphatics, which makes it a type of tissue that is very slow to heal. It also has no nerves and is therefore insensitive.

A major function of cartilage is to absorb impact, especially in the knees, and transfer forces in a pain-free manner.

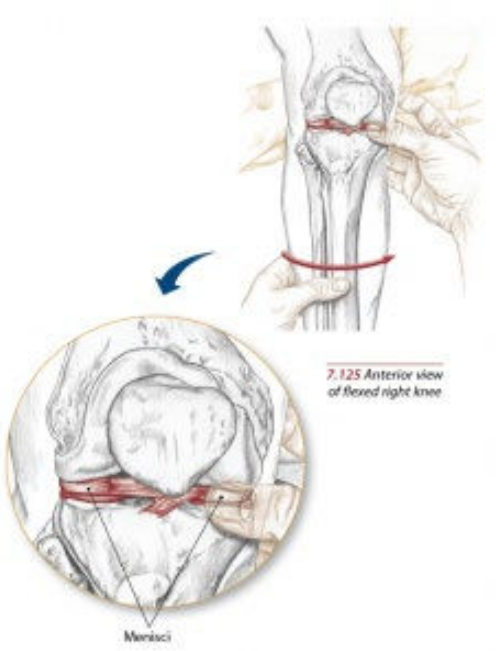
In the knee, there are two types of cartilage:

1. **Hyaline** - which covers the end of the femur, tibia, and fibula.
2. **Menisci** - a specialized hybrid type of cartilage that provides for the needed cushioning between the femur and tibia. Learn about meniscus anatomy and injuries in this article.

Composition of Ligaments & Cartilage Structures

Ligaments, which connect one bone to another, are composed of approximately 70% water and 30% organic matrix along with fibrocytes, the specific type of cells that make up tendons and ligaments.[1,2]

The organic matrix is a combination of ground substance (a combination of protein and carbohydrate complexes forming a gel-like substance) and collagen. In ligaments and tendons, 90% of the Organic Substance is collagen.



Collagen comprises 25 to 30% of the protein in the body with at least 15 types of collagens currently known with more recent studies identifying more than 20 types![2,4] Collagen production in the body can vary from individual to individual with the aging process and genetics playing the biggest role in the ability to make adequate amounts for tissue repair and maintenance.

In tendons and ligaments, the type of collagen found is called Type 1, which identifies its structural alignment, splice variants, and function when compared to the other many types of collagen in the body. [3, 4]

Type 1 collagen fibers tend to be more rigid than Type 2. Hence, the ability to withstand the forces generated by movement and keep the bones they hold together without a daily injury. Cartilage, which covers the end of all bones that touch each other, is a bit different in its composition when compared to ligaments and tendons.

When discussing the ligaments above and as will be discussed in part 2 of this series when we cover tendons, the cells that make up those structures are called "fibrocytes". In cartilage, the cells are called chondrocytes and the type of collagen is Type 2 as compared with Type 1 in tendons and ligaments.[1,6,7]

Varieties of Cartilage

In the human body, we can find three (3) types of cartilage:

1. **Hyaline** or articular cartilage is found at the end of long bones in the body. It is bluish-white in color, flexible, with low friction qualities that resist wear and tear and designed to bear and distribute loads. Hyaline cartilage provides the cushioning needed for repetitive movements.
2. **Fibrocartilage** is present in the intervertebral disks of the spine, covering the mandibular condyle in the temporomandibular joint, and in the Meniscus of the knee. It is also found temporarily at bone fracture sites.
3. **Elastic cartilage** is found in the pharyngotympanic tubes, epiglottis, and earlobes where the supportive tissue (cartilage) must possess elasticity (hence, the name "elastic" cartilage).

Chondromalacia Patella

Chondromalacia Patella is the degeneration of the cartilage between your patella and femur. Your kneecap, which sits over the front of the knee joint, glides over the Femur as your knee bends or extends. Chondromalacia Patella (also

called "Patellofemoral Syndrome", "Runners Knee", "Patellar Tendinitis" or "Jumpers Knee") begins when the kneecap does not move properly and rubs against the lower part of the femur.

Causes of chrondomalacia patella:

- The kneecap is in an abnormal position(also called poor alignment of the Patellofemoral joint)
- Tightness or weakness of the muscles on the front or back of the thigh
- Flat feet
- Too much physical activity that places extra stress on the kneecap

Symptoms of Chondromalacia Patella are pain behind, below or on the sides of the kneecap being more noticeable while climbing up or down stairs, performing deep knee bends, standing for long periods and running downhill.

Prepatellar Bursitis

Prepatellar Bursitis is the common cause of swelling and pain on top of the kneecap. The bursa are thin sacks filled with the body's own natural lubricating fluid. The bursa are very thin slippery sacks that are situated around our joints to prevent muscles, tendons and skin from catching on bony surfaces throughout the body.

When there is trauma, repetitive use or injuries to the knee, the bursa can swell and either fill up with blood or fluid, which in turn causes pain and swelling of the knee. If the trauma is associated with a tear in the skin the bursa can become infected, this is called infected bursitis.

Kneeling daily for extended periods of time or being sedentary increase the risk for prepatellar bursitis.

Symptoms of prepatellar bursitis are:

- Swelling over the kneecap
- Limited motion of the knee
- Painful movement of the knee

Bursitis of the knee can be treated by draining the bursa sac and in cases where infection is possible, an antibiotic is prescribed. In mild cases, resting the site along with ice therapy and anti-inflammatory medication may work just fine.

Now you've had a tour through the knee joint and can appreciate the many intricacies of the anatomy and associated injuries. Do you have clients with knee injuries or complaints discussed in this article?

How Incontinent Clients Can Reclaim Their Active Lifestyle

Some of your clients might suffer quietly from incontinence. It's an issue about which clients often hesitate to speak and it effects more people than we realize.

Tactfully bringing up this condition so you can work with it during exercise programming efforts will set you apart as a fitness professional.

An individual may present with one, or both, of the major forms of urinary incontinence: stress urinary incontinence and urgency incontinence. "[Both types] can exist simultaneously in the same person," says Deepak Kapoor, M.D., president *Advanced Urology Centers of New York (AUCNY)*.

Since each variety has its own list of potential etiology, these conditions need to be addressed differently. Stress incontinence comes about from "…leakage with coughing, laughing, sneezing, or anything that increases pressure in the belly," says Dr. Kimberly Ferrante,Clinical Assistant Professor in the Departments of OG/GYN/Urology at *NYU Langone Medical Center*.

Common Causes

There are a plethora of reasons why one's pelvic muscles become weak, paving the way for stress urinary incontinence:

- **Chronic coughing or sneezing:** Any condition/lifestyle habit that causes chronic coughing or sneezing, such as smoking or persistent allergies, can over time lead to leakage.
- **Obesity:** The body of an overweight individual places increased pressure on the bladder. "The more pressure you put on the urethral sphincter, which squeezes and holds urine in, the more likely you are to leak," says Dr. Ferrante.
- **Hormonal deficiency:** Estrogen is known to help maintain strength in the muscles surrounding the bladder and urethra. Post-menopausal clients often present with stress urinary incontinence; a dip in circulating estrogen levels causes thinning and weakening of the vaginal tissues.
- **Age:** Along with weaker vaginal muscles, the bladder muscles themselves can weaken with age.
- **Hysterectomy:** Clients who have undergone a hysterectomy, or any surgeries of the female reproductive system, may notice a residual weakness in the surrounding tissues.
- **Pregnancy:** Throughout the final trimester of pregnancy, hormones and extra weight place added stress on the uterus. Pushing during a vaginal delivery can negatively affect muscles supporting the bladder and urethra. Prolapse has also been known to occur, and any or all of these can result in incontinence.

Understanding Urgency

Unlike stress incontinence, urgency incontinence is a symptom of a potentially larger issue, according to Dr. Kapoor. If it presents with other symptoms, such as frequent or excessive urination, urgency can be an indication of an overworked bladder. Knowing a client's health history makes a trainer understand requests for frequent bathroom breaks, and spares a client any potential embarrassment. Here are some of the more common contributing factors:

- **Metabolic disorders:** High glucose levels signal the body to produce more urine, as is often the case with clients whose diabetes is not being well managed. Diabetes can also cause nerve damage, leading to signaling problems, a common cause of incontinence.
- **Neurological conditions:** Dr. Kapoor reports that approximately 5% of Multiple Sclerosis cases are diagnosed by urinary difficulties.
- **Frequent bouts of constipation:** Constipation can sometimes impact the nerves in the bladder, once again interfering with the signaling and causing urgency incontinence.

Pelvic Anatomy

In an effort to support the pelvis and bladder, and constrict the bladder opening during movement, pelvic floor muscles work in opposition to an impact or an imposing load. If pelvic muscle strength is insufficient to counter impact forces, a leak or trickle of urine may result. Thinking in terms of applying pressure on a water balloon that has not been tied properly, it is easy to visualize the outcome.

Pelvic muscles also work in tandem with those of the core, supporting the abdominals and diaphragm. Exercises such as those encountered during Pilates workouts, mat or Reformer, do a wonderful job of core strengthening, and over time may help to maintain such strength once the initial weakness in the pelvic floor has been properly addressed.

Could Exercise Be at Fault?

In addition to the aforementioned reasons, weakness in a female's pelvic floor muscles may be the result of a congenital malformation or other comorbid condition. However, another more unfortunate option is that the high-intensity exercises themselves may have weakened the pelvic floor.

Activities that involve jumping/landing/foot strikes, such as volleyball or gymnastics, have a tendency to increase the pressure on the pelvic floor muscles. This may lead to urinary incontinence, especially when coupled with pre-existing factors such as weak core muscles or back pain.

Engaging in heavy weightlifting may also exacerbate problems, most often when such training is done improperly. As we have no doubt observed on many occasions, some clients unwittingly hold their breath while lifting greater loads; this increases abdominal pressure, placing an unwelcome strain on muscles located in the pelvic floor.

One way to help clients avoid this scenario is by suggesting they sit when executing certain moves, such as a military press. When doing standing exercises such as squats, encourage clients to position their legs no further apart than shoulder width.

Safer Moves For Runners

In addition to making changes in a client's stance during resistance training, there are minor tweaks we can make in clients' aerobic exercise patterns that help alleviate and even prevent urinary incontinence.

Runners can increase their cadence (number of foot strikes per minute) and shorten each stride to reduce impact. Running posture, too, plays a definitive role. Simply leaning forward slightly offers the bladder better support by the pelvic bones. Inappropriate height/weight ratios also can lead to problems, since carrying extra pounds increases the impact felt with each foot strike.

If such a client expresses an interest in becoming a dedicated runner or is considering a 5K or half-marathon, a trainer can explain how safely shedding a few pounds prior to fully embarking upon a serious program can lead to his becoming a more effective runner. In the interim, there are other training/cardio options you can offer, such as swimming, cycling, powerwalking and low-impact water aerobics.

Too Much Of a Good Thing

Women's Health experts Meagan Peeters-Gebler PT, DPT, CSCS, CMTPT, and Brianna Droessler-Aschliman PT, DPT, CMTPT are proponents of pelvic floor strengthening moves. However, they also offer a bit of cautionary advice. While it is true that a variety of exercise routines involve engaging and tightly clenching the pelvic floor/abdominal muscles,

contracting these muscles *too tightly* and for an *extended duration*can lead to the very problems trainers are trying to correct or avoid.

"We have this mentality that more is better," Peeters-Gebler says, "and that gripping and never letting go makes muscles stronger. Women need to learn how to do exercises properly – including Kegels – by first and foremost engaging the pelvic floor and abdominal muscles, and then learning to relax them. An overactive pelvic floor can cause problems just like a weak one can."

As with most aspects of fitness, balance is the key to minimizing the inconvenience of urinary incontinence. By showing clients alternatives to more traditional exercise movements, we can help them not only combat but prevent incontinence from interfering with their active lifestyles. Once mastered, clients can perform strengthening moves in between training sessions, enabling them to make the most of time spent with you, their trusted professional.

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Starting a Corporate Wellness Business

Corporate wellness offers enormous opportunities for fitness professionals. And the opportunities are not boilerplate.

Each business has a different culture with diverse employees - each of whom has distinct needs and faces unique challenges.

This means you can be creative and pioneering in your efforts to address those needs and challenges.

Necessary Corporate Changes

The early focus of worksite-wellness programs was on weight loss, disease management for high-risk employees, and/or meeting rudimentary criteria to receive discounts on health insurance premiums.

This means one of the primary goals was to control employer healthcare costs – not necessarily to bolster the health, productivity, and happiness of the labor pool.

Physical health and incentivizing programs to reduce costs to employers and employees are valid and valuable objectives. However, if these are the only objectives of a corporate wellness program, it is unlikely the larger goal of improving the well-being of employees will be met over the long-term.

Further, the return on investment (ROI) to the employer will not be significant. Wellness is a puzzle. All the pieces must be included or the picture won't make sense.

Fortunately, corporate wellness is evolving and incorporating more comprehensive and robust program models with a holistic approach to personal health. Physical health is still important, but corporate wellness is beginning to understand the relationship between physical health, mental health, stress management, sleep, education, and workspace structures (ergonomics).

As more and more employers and organizations recognize the need to support the "whole person" and emphasize the value of all interrelated facets of wellness, the ROI grows along with the health of their staff.

Tapping into Corporate Wellness

The best place to begin with corporate wellness is by seeking additional training and education such as a Health Coach or Behavior Change Specialist certification from an accredited and respected organization. The more education you have and the deeper your knowledge of behavior change and workforce challenges you possess, the more fruitful your efforts.

Next, start researching the corporate wellness market.

- What is already in place?
- What is missing? Are there gaps?
- Are there aspects you wish to replicate or build upon?

You may find no programs (or no comprehensive programs) exist. Even if the businesses are small, most employers want a strong and satisfied workforce because it directly impacts the bottom line.

If employees are successful, the business will be, too (barring any major budgetary impacts or funding cuts – those are separate factors to a business's longevity). Conducting this research will help you identify your value and what you can bring to the table.

As always, network continuously. Networking should be as much of a priority as continuing education. A strong network means links to businesses, employers, and referrals.

Qualities of Strong Corporate Wellness Programs

Wellness Council of America (WELCOA) uses a framework for evaluating and building quality worksite programs. Review the seven benchmarks to help guide you in developing a model of your own.

1. Committed and Aligned Leadership
2. Collaboration in Support of Wellness
3. Collecting Meaningful Data to Evolve a Wellness Strategy
4. Crafting an Operating Plan
5. Choosing Initiatives that Support the Whole Employee
6. Cultivate Supportive Health Promoting Environments, Policies, and Practices
7. Conduct Evaluation, Communicate, Celebrate, and IterateEach of the seven benchmarks

Each of the seven benchmarks has a free toolkit to further guide your efforts.

Further, Forbes outlined eight trends to watch for that will ultimately impact employee wellness programs.

1. A shift in the focus of wellness by employers (not just a physical health focus).
2. An increase in personalized experiences (no one-size-fits-all approach).
3. An emphasis on mental health
4. Keep it simple approach (less is more)
5. Focus on sleep (Finally! Tired employees are unproductive employees!)
6. Artificial Intelligence software implementation to identify trends and future forecasts.
7. Healthy vending machines (What? No more cheez-its and rolos or other food-like items?!)
8. Wellness mergers (large wellness vendors merging with smaller vendors to provide more comprehensive services)

Action Steps into Corporate Wellness

If corporate wellness is an area you wish to explore, Shirley Archer, JD, MA (IDEA Fitness Journal, May 2018) offers six actionable steps any fitness professional can take to enter the industry and be successful.

1. Get training. Learn all you can about human behavior and the process of change.
2. Join organizations (see resources) and network.
3. Contact businesses and employers. This will provide insight into what is missing, what is needed, and what already exists.
4. Learn what is valuable to the company. What is the employer looking for? Which metrics do they want to improve? Do you have a valid and reliable plan?
5. As you build programs, plan with the end in mind. This means you should include methods to assess and evaluate the programs so that you have data to present which speaks to the programs' effectiveness.
6. Craft a pitch. This is similar to a value statement or mission statement that addresses what you do, who you serve, and what sets you apart from other professionals. This statement should be brief but powerful.

To add a seventh and eighth action step: I highly recommend practicing motivational interviewing as it will become an invaluable conversational tool to use with future clients; it is especially helpful with those clients who are ambivalent to change.

Finally, hone in on what makes a program great. In the corporate wellness world, quality programs are affected by the culture of an organization. Making a wellness program practical, applicable, and accessible is separate from encouraging that employee wellness become a cornerstone and core value of the organization.

Successful programs are integrated into the culture and structure of a business. This means the work environment should support rather than detract from employee wellbeing (healthy snack options on-site vs. bowls of candy at the center of every conference room table).

This also means there should be a dedicated budget and resources to manage the program. You won't single-handedly change the culture, but you can emphasize what a program needs to be successful before it is designed and implemented.

The Take Home

Corporate wellness is a continually evolving area of the fitness industry, which makes it exciting and dynamic. Furthering your education and training will allow you to be a part of the future of corporate wellness. Businesses need (and ultimately want) a well workforce. Happy and thriving employees attract consumers who will support the business. Everyone wins.

Resources
Health Enhancement Research Organization
International Association for Worksite Health Promotion
Wellness Council of America
Wellcoaches School of Coaching

Time Restricted Eating and Autophagy

“The best of all medicines is resting and fasting.” – Benjamin Franklin

What if there was a way to achieve better health while doing “nothing”? Perhaps Ben Franklin had it right all those years ago. We all get caught up in “being a verb”, especially in our profession.

Every day we encourage clients to do more: train harder, engage in more cardio, seek out new forms of physical recreation…the list goes on and on. Imagine being able to make positive strides in our wellbeing by actually doing less!

The human body is a brilliantly complex machine, capable of executing billions of processes, most of which we are unaware. It (the human body) can transfer energy, manufacture antibodies, and utilize nutrition to feed its cells. Our bodies also possess unique properties of detoxing and self –preservation when under extreme duress.

Autophagy as a Fasting Motivation

One such property that has recently entered the public eye is the concept of autophagy. This word, of Greek origin, translates literally to “eating of self”. If upon reading, you instantly call up a mental image of life-threatening flesh-eating bacteria, imagine instead a process that is beneficial to our bodies.

Autophagy is classified as an auto-regulatory degrading process, one that strives to preserve the body’s balance of energy, typically in response to stress. “Think of autography as our body’s innate recycling program,” says Colin Champ, M.D., a board-certified Radiation Oncologist and Assistant Professor at the University of Pittsburgh Medical Center. “Autophagy makes us more efficient machines to get rid of faulty parts, stop cancerous growths, and stop metabolic dysfunction like obesity and diabetes.”

When the human body encounters a stressful situation, such as a pathogenic invader, the innate desire to return to homeostasis is activated. The optimal mechanism by which our elaborate machine accomplishes this is by kicking up efforts to eradicate the microbe from the cells as well as clear out toxins caused by the immune system’s response to infection.

When considered in this light, we can clearly see the beneficial side of an infection, the body responding to stress by ridding itself of undesirable cellular debris.

Can stress, therefore, be considered a life-saving element? “It’s our ancestral and evolutionary response to dealing with feast and famine in times of stress,” says Dr. Champ. “Since a lot of these things would kill us, like starvation and exercise, it only makes sense that after millions of years we adapted those mechanisms to make them positive.”

Reach Autophagy with Time-Restricted Feeding (TRF)

Nobody wants to deal with a microbial infection, no matter how positive the autophagy response seems. Scientists began to wonder if the simple stress induced by a lack of nutrition might also elicit a similar response. As it turns out, this is indeed a powerful way to ignite the autography dynamic.

One manner by which the human body has demonstrated proof of this theory is through intermittent fasting, or TRF (time-restricted feeding). There are several variations on this theme that are rapidly gaining mainstream popularity.

Such meal plans run the gamut from a 24-36-hour fast a few days a month to a 12-14-hour fast every day. A slightly less stringent offshoot of these is the 5:2 plan, where meals are clean, healthy and contain a reasonable number of calories

for 5 days each week, while on the remaining 2 days calories are substantially reduced, often to 500-600 calories throughout the day.

The 12 hours on/ 12 hours off approach seems to resonate more easily with the majority of the population. An individual may enjoy breakfast at 7:00 am, lunch at noon, and conclude the evening meal by 7:00. Assuming nothing but non-calorie fluids are consumed from then on until bedtime, this individual will awaken and once again eat breakfast at 7:00 am.

The 12-hour "fast" ends up taking place predominantly during the overnight hours. While the thought of not snacking at all during those 12 hours seems daunting at the onset, the many benefits to intermittent fasting outweigh the discomfort that initially accompanies such a time shift in nutrient intake. Thus, we are able to think of this entire protocol of time spent *not eating* as "simply doing nothing" and yet achieving great results in terms of health.

Benefits of Time-Restricted Feeding

The human body continuously engages in a self- detoxification process 24 hours a day. This requires a considerable amount of energy…but so does the process of digestion. During a 12-hour fast, digestion is not a primary focus, enabling the majority of energy to be directed at eliminating toxins and healing. Allowing the body ample time for cellular repair, the intermittent fast becomes highly beneficial for optimizing detoxification.

The human body stores usable energy in the form of glycogen, usually a supply sufficient enough to provide 6-8 hours of expendable energy. Once glycogen is depleted, the next powerhouse to be tapped is the energy stored in fat cells.

While eating small meals throughout the day will keep glycogen stores replenished, convincing the body to prioritize fat stores for energy becomes much more challenging. The process of TRF, with its inherent 12-hour fast, extends the time between meals, thereby forcing the body to tap into fat reserves for usable energy.

Can you exercise while fasting?

When we exercise, energy expenditure increases. While this is inherently a positive dynamic, it nonetheless places stress on our cells, and components get worn out faster. "Determining the level of exercise needed to stimulate autophagy (is a) hard question to answer at the moment," says Daniel Klionsky, Ph.D., a cellular biologist at the University of Michigan.

If done properly, performing exercise during a fast can be highly beneficial.

As previously mentioned, in the absence of glycogen stores during a fast, the body will be forced to utilize fat stores as an alternate energy source. However, workouts may need a bit of alteration, ideally limiting the duration of the exercise.

"When glycogen is in short supply, your body also reverts to breaking down protein – your muscles' building blocks – for fuel," said Kelly Pritchett, Ph.D., R.D., Assistant Professor in Nutrition and Exercise Science at Central Washington University and a board-certified Sports Dietetics Specialist. Exercising too long on an empty stomach may cause the body to begin burning protein as the fat reserves become depleted. Once this cascade has been set into motion, the body is at risk of losing hard-earned lean muscle mass.

In the absence of nutrition-based energy, such as during a prolonged fast, the body initially succumbs to the weakness brought about by lowered levels of glycogen and blood sugar. Once the habit of regular intermittent fasting becomes a comfortable lifestyle, our energy systems do adapt. However, experts in this field caution that initially overdoing the time and/or intensity of workouts may have detrimental effects. Sufficient rest periods therefore become even more of a necessity.

Two Different Approaches to Consumption

Results have been highly positive in response to the 12 hours on/12 hours off protocol, once the body adjusts to a period of hunger at the onset. This timing protocol is in sharp contrast to the typical "bodybuilder meal plan", that of consuming 6 small protein-rich meals throughout the day to optimize lean muscle mass growth. If each delivers health improvements, which method is the most desirable?

To answer this question, I began observing an expert in this area, one who exemplifies the beauty of nature's circadian feeding cycles: our granddaughter. When she was born and throughout her infancy, Madelyn would eat on demand. Some days it was every 2 hours, and some difficult evenings included "cluster feeding", during which periods she would nurse on and off at 45-minute intervals.

Clearly, Madelyn was not eating in response to social cues or the goal of adding muscle mass. Rather, her body was responding to its *innate hunger cues*: satisfying a physiological need was all that mattered in her nascent world. At this stage of life, such an inborn feeding schedule more closely resembles that of the competitive bodybuilder.

As she approached her 1st birthday and continues now that she has reached the 15-month mark, Madelyn eats breakfast at 7:30 am, lunch from 11:30-noon, enjoys a snack after her nap at 3:00 pm, and has dinner with her parents around 6:30 pm. Nothing is consumed between the end of dinner and her 8:00 pm bedtime.

Mother Nature instilled within our little one the innate ability to slowly and seamlessly shift from one method of feeding to another. Now responding to a new circadian rhythm, Madelyn's body ends up being on an overnight fast of approximately 13 hours, having consumed all of her calories between an 11- hour time frame.

Is this an example of evolution, the body's attempt at self-cleansing? It is a question worth pondering.

Take-Away Message

Just as in program designs for clients, there is not a single method of consuming and timing nutrition that suits every individual. Often clients ask us to recommend "the best meal plan" for them to follow in order to achieve the desired results. We need to remember that each of us is unique in every way, including how our bodies metabolize, digest and burn food for fuel.

Intermittent fasting is simply one tool in the toolbox, a choice to present to clients in much the same way that we can either promote protein/vitamin/mineral supplementation or a diet of real, whole foods. The overriding importance is an overall healthy approach to living.

We cannot expect a single aspect to be the panacea for every health challenge we may face during our lifetimes. However, by slowly experimenting with a variety of approaches, we can assist our clients in ultimately paving the way for an optimal nutrition/workout plan to meet each one's unique goals.

Have you had experience with intermittent fasting versus a typical bodybuilding nutrition method?

The Importance of Activity for Children with Special Needs

Exercise programs and physical fitness centers need to accommodate children with special needs. Unfortunately, there are very few doing so. This is a problem because, over the last 10 years, the population of children with special needs has increased over 165%. According to Autism Speaks, the diagnosis of autism affects 1 in 45 children.

As this segment of our population continues to grow, we need a better understanding of autism and other disabilities. It is important that we offer programs and treatment for both children and adults with disabilities. While many early intervention and cognitive programs have become available, there is still a lapse in the accessibility of fitness programs.

Parents and schools are earnestly focused on academics and social interaction in the classroom. Physical fitness is the last thing anyone worries about, and, in most cases, kids with special needs are allowed to skip gym class. The classroom is an integral part of development, as well it should be, but physical fitness is often overlooked and it is actually one of the most crucial components for special needs development.

Academics and social interaction can be integrated into physical activities, and the combination of these has the potential for much better results.

Science shows that physical activity stimulates the nervous system and forces the body to work as a unit rather than in parts. Improving nerve function is beneficial for anyone with a disability.

Exercise creates and improves motor pathways and proprioception, stimulates serotonin production, helps regulate the energy systems, builds a mind-body connection, strengthens the immune system, helps control weight, and builds muscle.

Additionally, the nervous system and the immune system are more closely connected than people realize. For example, **stress causes the body to go into a state of fight or flight. This can disrupt hormone levels, especially cortisol, which can lead to a weakened immune system. Therefore, exercise is good for neuromuscular health and for immune function, so it makes sense to increase physical activity.**

Special needs children are 58%more likely to be obese and to have below average muscle mass since physical activity is usually pushed aside. Physical, emotional, and behavioral issues can be addressed in a workout session, which demonstrates that education can be achieved through physical activity in a social setting. In fact, **it is quite simple to make fitness both fun and educational.**

Fitness Programming for Special Needs

Fitness programs will vary depending on both the child's ability to participate and his/her physical and cognitive limitations. For example, **if a child does not have physical issues and is high functioning,** he/she can participate in a circuit that includes a mini obstacle course with hopscotch, ring jumps, an inertia wave, and balance walks, this can be followed with a simple Math or English question before moving on to the next obstacle.

For a child with more physical challenges, you can make an easier obstacle course that includes tossing a light medicine ball back and forth while counting out loud how many times he/she throws it, thereby incorporating social, mathematical and physical activities into the workout.

For children with even more limited physical constraints, the activity can be adjusted to fit their abilities. For instance, a child in a wheelchair with limited limb movement would need assistance moving his/her limbs in order to improve upon the movements he/she already has. Further, if the child is non-verbal, he/she can engage with number puzzles and use a pegboard to count the number of exercises performed.

While it may be intimidating, personal trainers should not be fearful of training special needs children since the same protocol should be followed. **As with any client, a trainer should evaluate the child's current state of fitness and address weaknesses.**

Therefore, if balance is poor and core muscles are weak, exercises should be assigned to make improvements. Just because some kids cannot perform higher intensity exercises does not mean they cannot benefit from simpler tasks, such as standing on one foot while holding a rail.

Socialization Through Exercise

Physical activity is crucial for children to function in everyday life. Walking, bending, sitting, standing, balancing, and carrying are all activities needed for daily living. **Exercising and training builds strength and confidence in children.**

Additionally, physical activity can be a social outlet through playing on the playground or during group activities and in gym classes. The socialization from playground interaction and a gym class far exceeds benefits compared to classroom socialization.

By nature, children like physical activity, and they will request it when they are exposed to it as part of their routine. Special needs children have the same nature, and they are physically capable of activity.

However, many of them have a great deal of anxiety and therefore may not participate for a variety of reasons including, but not limited to, noise, lighting, touching and fear of groups. Non-verbal children are more likely to experience excess stress. **Exercise is a great way to burn off excess nervous energy which can improve calm attention in non-verbal children.**

Nutrition Considerations

Fitness and nutrition are intertwined to improve both function and health. Nutrition is a key factor in maintaining a healthy nervous and immune system since 80% of the immune system is housed in the gut. With Autism, it is important to rule out intestinal dysbiosis, check for environmental toxicities, investigate impaired detoxification, and look for heavy metal toxicity.

Additionally, check for high levels of inflammation, evaluate mitochondrial dysfunction, assess food sensitivities including gluten, monitor oxidative stress, and look for nutrient deficiencies in zinc, magnesium, manganese, vitamin A, vitamin B12, vitamin D and omega-3 fats.

These issues can cause inflammation and cause leaky gut syndrome, which may disrupt digestion, nutrient absorption, pH of the blood, the lymphatic system, and the nervous system. When toxins and large food particles enter the blood stream, they can cross the blood brain barrier and cause both behavioral and cognitive issues.

Changes in diet and supplements are good tools to help combat these nutritional concerns and enhance the benefits of exercise. Poor nutrition and vitamin deficiencies can contribute to behavior issues and diminish the body's ability to regulate energy. It is important to be aware of such factors as contributors to the symptoms of various disease or disorder.

Take it Slow

Activity should be introduced slowly and carefully and take into account both the child's physical and emotional requirements. A small task such as rolling a ball back and forth will get a child moving while interacting with another person. Furthermore, playing catch and rolling a ball are both equivalent to a conversation, and it is a great way to introduce your child to social play, especially for non-verbal children.

All these small interactions add up to create change and to improve the quality of life for any child. By combining purpose-based exercise and education into group and one-on-one sessions, and encouraging proper nutrition as advised by his/her general care physician, you will see vast improvements in a number of areas for your special needs clients.

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Seizure Safety: Exercise and the Epileptic Client

Exercise can benefit the epileptic client. Over 2.5 million Americans are currently living with epilepsy and need exercise just like everyone else.

Epilepsy is a neurological disorder characterized by frequent seizures, believed to originate from abnormal spurts of electrical activity in the brain.

While the majority of cases have unknown etiology, epilepsy can be brought on by genetic factors, head trauma, stroke, tumors or an infection within the nervous system.

While a potential new client with epilepsy may present a challenge to many personal trainers, or at the very least a situation they have not previously encountered, it is good to be as informed as possible should such an opportunity present itself. There is much that we can do to improve the quality of life in such individuals.

Benefits of Physical Activity for Epilepsy

Many of the diseases typically linked to a sedentary lifestyle -- cardiovascular disease, type 2 diabetes, hypertension, and osteoporosis— are comorbid conditions among individuals affected by epilepsy. Despite a shift in medical recommendations toward encouraging rather than restricting participation in exercise, this demographic remains less active than the general population.

Both clinical and experimental studies have analyzed the effect of physical exercise on epilepsy. A study conducted in Norway examined the physical activity patterns of a group of women with uncontrolled epilepsy.

Data revealed that 60-minute sessions of aerobic exercise, engaged in twice weekly, resulted in a significant reduction in the number of seizures experienced.

The subjects also reported/demonstrated:

- fewer muscle pains
- improved sleep
- a lessening of fatigue and depression
- improvement in oxygen flow around the body

Decrease Anxiety and Enhance Mood

Aberrations in brain substances known as neurotransmitters are commonly associated with mood disorders and epilepsy. Some of the more familiar neurotransmitters include serotonin (the “feel good” substance), noradrenaline (known as the “fight-or-flight” hormone), dopamine (responsible for sensations of pleasure and pain), and GABA (helps control fear and anxiety).

Since a regular exercise program can affect the mechanism of these substances, many individuals living with epilepsy experience improvements in mood as well as a decrease in levels of anxiety.

Can Exercise Cause a Seizure?

Although there are rare cases of exercise-induced epileptic seizures, studies have shown that physical activity generally decreases seizure frequency while also leading to improved health. While this is all positive, it is equally important for a

trainer to fully understand the limitations of an epileptic client, directing him toward the safest and most effective workouts.

Modes of Exercise and accompanying Risks

Exercise can be broken down into three general categories of physical endeavors, based upon potential risk of injury or death to the participant. When training a client with epilepsy, keep this in mind before suggesting he engage in an advanced-level sport.

The first group encompasses sports with no significant additional risk.

Th**e second category** includes physical activities that potentially pose a moderate risk to epileptic clients. Many contact sports -- football, hockey and rugby, for example – are associated with increased risk of head injuries, which have the potential to trigger or adversely affect epileptic seizures. Clients may be cautioned against participation in the absence of appropriate safety headgear.

The third group consists of sports that involve a significant risk should a seizure happen during participation. Hang gliding, scuba diving, skiing and rock climbing fall into this last category.

It is prudent for trainers to explain all potential risks to new clients, especially those who have never undertaken serious physical activity and may be significantly deconditioned. Assessing and determining each individual's attitude toward risk-taking and personal responsibility may help prior to starting a training program.

Program Design And Implementation

When preparing a workout for an epileptic client, consider choosing activities that fall into the first aforementioned category, especially with those new to exercise. Supervised strength training, using dumbbells, resistance bands, and weight machines, is a great starting point. Body-weight-only strengthening moves, such as push-ups, pull-ups, and abdominal exercises, are also ideal.

Offering Options

Clients often ask for appropriate exercise formats in which to engage when they are not with their personal trainer. Yoga is among the most popular in terms of group exercise. This discipline offers a combination of flexibility and strength, and also functions as an anxiety reducer, a common trigger for many living with epilepsy.

Walking and biking are also healthy and relatively safe activities to encourage for epileptic clients, particularly when done with a workout buddy who knows how to recognize and respond to a seizure. Swimming and water aerobics are also great modes of exercise.

Stress to your client the importance of alerting the lifeguard to his condition prior to entering the pool; seizures that occur in the water pose a unique and potentially dangerous situation.

General Safety Considerations

Even if an epileptic client assures his trainer that the frequency of his seizure rate is extremely low, trainers and gym owners can protect themselves – and their clients – by adhering to some basic safety tenets.

Inquire about any known triggers; then have a client describe how his body typically reacts in the midst of a seizure. By learning the best ways to help in the throes of a seizure, both you and the client can be kept safe should this occur.

Trainers often find that a client's motivation and energy are contagious, and may unknowingly push an epileptic client too far. Pay attention to unusual signs of physical exhaustion, dehydration and overheating. It is also a good idea to have an emergency phone number on hand, either a family member or the client's physician, in the event of a serious seizure.

The Nutrition Nuance

A balanced diet from different food groups helps the body and brain to function. This may reduce the risk of seizures for some people with epilepsy, knowing that both dehydration and hypoglycemia can exacerbate a seizure risk.

Although there is little evidence that a balanced diet has a direct effect on seizures, it provides essential nutrients and maintains a steady energy level. A prudent nutritional plan may help clients feel positive and more in control of their lives and decisions about managing their epilepsy.

Special Considerations For Seniors

Epilepsy is not always the first possibility that comes to mind when an older client suffers a seizure or related episode. Its clinical presentation can resemble other more common conditions, such as the aftermath of a stroke, head injury, brain tumor/surgery, chronic alcoholism or dementia.

By inquiring about and discussing any pre-existing comorbid health conditions during that all-important client screening and assessment, trainers can make informed decisions in case of an emergency.

Clients living with unique health situations will value trainers who take the time to listen, understand, and work within their challenges. A little knowledge, a little empathy, and a lot of empowerment can make for a strong and successful working relationship.

How have unique health issues impacted your business?

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Breathing New Life Into Clients With COPD

When a client has trouble breathing because of Chronic Obstructive Pulmonary Disease (COPD), it changes the approach to physical fitness. Armed with the physiology of respiratory dysfunction, personal trainers can safely compile a workout regimen that respects the client's unique challenges while still enabling him to reach his goals.

For individuals living with COPD or chronic respiratory failure, the simple act of drawing in a breath requires a tremendous amount of energy.

Respiratory Care Week, traditionally celebrated in October, is a good time for personal trainers to educate themselves on breathing conditions that may hamper clients' abilities to succeed in the gym.

Many clients come to us with a goal of improving endurance and cardiovascular health; we are well prepared to train them for the results they desire. However, while the respiratory system may go hand-in-hand with the human body's cardiovascular function, this is not often the main focus when creating an exercise protocol.

The Physiology of Breathing

The respiratory system involves a transfer of oxygen and carbon dioxide. When we inhale, the body absorbs oxygen and releases carbon dioxide upon exhaling. The muscle of the diaphragm, which sits directly below the lungs, plays a key role in facilitating this process.

Circulating oxygen levels in individuals with COPD tend to be lower than their healthier counterparts. If the levels decrease too dramatically, the brain sends signals to the diaphragm and supporting muscles, compelling them to work harder. Recruitment of neck and shoulder muscles typically occurs, in an attempt to coerce the lungs to perform. Thus, what many of us consider automatic can turn into an exhausting and sometimes debilitating endeavor.

Respiratory Challenges and Exercise

Carefully executed hands-on studies demonstrate evidence that exercise training improves the performance of daily activities for those with chronic pulmonary dysfunction. Experts feel that many factors contribute to these benefits, such as an uptick in aerobic capacity, and enhanced peripheral muscle function. For patients whose breathing issues necessitate hospitalization, those who have been incorporating exercise into their lives often benefit from a shorter hospital stay.

In addition to increasing aerobic capacity, individuals with chronic respiratory challenges may benefit from exercise in other ways. Ideally, over time, the heart grows stronger, thereby increasing overall circulation and even lowering blood pressure.

Patients notice that they are able to achieve a better night's sleep; a rested body has more energy to expend the following day, which translates to less effort when moving through life's activities.

Program Design for COPD

A triad approach has been shown to yield positive results. Such a program consists of 3 basic exercise components: stretching exercises to encourage and enhance flexibility; strengthening exercises performed with light dumbbells, specifically addressing the muscles in the upper trunk region; and aerobic exercises to improve breathing while increasing endurance of the cardiorespiratory system.

Of equal importance to knowing what to include during program design, a trainer must be keenly aware of the exercises that experts view as strongly contraindicated. Lifting very heavy weights, or pushing excessive loads, places too great a demand on compromised clients.

Similarly, push up's and sit up's should not be included, along with isometric exercises, which necessitate pushing force against an immovable object. Modifying strength training moves simply involves lessening the period of intensity within exercise sets.

By including moves that focus on using arm motions to opening the chest muscles, breathing will over time become less labored.

Environmental factors should also play a role when planning an outdoor workout routine. Clients who already have difficulty breathing may find the problem exacerbated in weather that is humid or excessively hot or cold. Even on a perfect autumn day, avoid taking through a circuit-training course that involves the climbing of steep hills.

Unique Skills Support a Unique Niche

Many trainers are certified in areas of expertise that do not require machines and weights. For example, the breathing techniques and slow movements taught in a Tai Chi class can help to improve a client's posture, which is often a weakness for those living with compromised breathing issues.

Balance too seems to get easier with these movements. A major goal of many Tai Chi programs is helping an individual relax, calming his mind and restoring energy.

Aqua therapy in a warm-water pool also yields great results. If the humidity is not too much for the client, being temporarily buoyant eases the movement of limbs without placing undue strain on the respiratory system. Deep breathing exercises can be practiced in the water and can serve to improve circulation and flexibility.

The Exercise-Induced Asthma Client

In addition to COPD, other commonly experienced respiratory conditions can render exercise more of a battle than it already is for many individuals. Exercise-induced asthma, or EIA, is present in many who already suffer from asthma or bronchitis. Aside from being overweight and/or deconditioned, both of which are significant risk factors during exercise, there are a multitude of triggers that can exacerbate EIA.

Prior to embarking upon working with such an individual, the trainer should familiarize himself with the triggers that specifically affect that client. A common trigger is cold, dry air. A high pollen count, air pollution and accompanying allergies/sinus infections can easily bring on an episode of EIA, particularly during bouts of high-intensity training. Such knowledge is the trainer's cue to begin each session with a warm-up at least 15 minutes in duration.

If a workout program includes extended cardiovascular activity, such as 10 minutes on the treadmill or stationary bike, a trainer may notice that the client shifts from normal inhalation to strictly mouth breathing. This can result in each inhaled breath consisting of drier air, in the absence of moisture provided by the nasal passages.

Despite attempting to increase the client's endurance, this very effort may actually bring on an episode of EIA. The tried-and-true "talk test" will provide a fairly clear picture of how the client's body is responding to the exertion. It is prudent to ask the client beforehand how you can best help him if symptoms begin or intensify.

Ways to Help This Population

Reaching out establishing connections with pulmonologists in your area can point you towards a new sales market. Share your expertise, setting the stage for potentially creating exercise programming for their patients, either at your gym or in a conference room of the medical facility. You now possess the knowledge to integrate yourself into a professional respiratory team and start improving patients' quality of life.

Meet with your facility's Fitness Center Director and discuss hosting an event to raise both awareness and funds for the *American Respiratory Care Foundation* (ARCF). Encourage your co-workers to help you support respiratory research and education for professionals and the patients they serve.

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The Future of Fitness and Healthcare - Which Way to Go?

No longer is fitness the sole domain of aerobics instructors in their 20's and 30's, conducting group exercise classes with seemingly boundless energy. What was a "fitness craze" has evolved into an industry replete with highly educated individuals of all ages, seeking science-based solutions to not only exercise issues but healthcare and longevity as well.

Do you possess the skill, talent and drive to propel our industry into the future?

The idea of fitness, and the pursuit of excellence thereof, has been a part of our society since the days ancient Greeks launched the first Olympic Games. Jack LaLanne, Jane Fonda, Kenneth Cooper and Richard Simmons fostered an even greater interest, embracing exercise as a career path.

Soon, private health clubs and fitness centers were popping up nationwide, all touting the same message: take control of your health and physical well being by incorporating enjoyable exercise into your lifestyle.

The Missing Link

However, a wall seems to have been hit in terms of the future of our industry. Impasses are popping up in many different realms, preventing fitness as a lifestyle from becoming wholeheartedly accepted as a key part of mainstreaming health management. Where are we falling short in our efforts?

The industry proudly boasts of reaching and catering to 75% or so of the public, yet these are the individuals who already actively engage in proactive health care through exercise. How, then, do we educate and convince the other 25%, many of whom are licensed medical professionals?

Can Exercise Be Preventative Medicine?

In many countries outside of the United States, public health focuses on prevention rather than cure. Strict Western medicine tends to favor treating an illness or condition either by offering a medication or a surgical procedure. This poses a significant burden on our country's resources.

Medicare and Medicaid programs alone currently spend $84 billion a year on what have become the five major chronic conditions afflicting today's population: diabetes, heart disease, depression, cancer, and arthritis. Medicare costs for treating depression mushroomed from $1.3 billion in 1992 to $2.1 billion in 2000.

According to Dr. James Dillard, author of the book *The Chronic Pain Solution: Your Personal Path To Pain Relief*, "People who exercise have less heart disease, diabetes, and cancer….It's a no-brainer." He further explains how data now exists illustrating "…all causes of mortality are lowered by exercise".

As educated fitness professionals, we already pass on to our clients the knowledge that exercise may hold many physical and emotional health conditions at bay. In fact, it has often been said that if "exercise" could be delivered in a pill, it would be the most requested and prescribed medication in the world.

It is incumbent upon our industry to keep step with the medical professionals, encouraging them to explain the effectiveness of exercise when speaking with patients, both healthy individuals and those potentially at risk for developing chronic illnesses.

Tiers of Treatment

The paradigms of preventive and integrative medicines are in their infancy within our society. As defined in 1948 by the World Health Organization (WHO), prevention refers to "the range of measures aimed at preventing or reducing the number and seriousness of diseases, accidents or disabilities".

3 predominant tiers of prevention currently exist, and each does play a role in today's public and private health initiatives, albeit not in a very balanced manner.

1. The first tier encompasses the actions propelling us in the direction of decreasing incidence of disease in a population and aims to reduce the risk of new cases emerging.
2. The goal of the second tier is to reduce the prevalence of a disease in a population. This takes the form of action when a disease first appears, in an attempt to arrest its development and eradicate potential risk factors.
3. The third tier is where the majority of Western medicine resides. Its main focus is reducing the recurrence of chronic conditions in a population and to treat/mitigate complications, disabilities, and relapses once such diseases become acquired.

It is evident that a stricter adherence to Tier 1 might be a more prudent lifestyle construct than relying on ending up at Tier 3. The challenge is delivering this message to the entire population, not just preaching to those already engaged in such behavior.

Integrative medicine is an excellent starting point for such endeavors. As the name implies, such a paradigm seeks to blend conventional Western treatments with alternative and complementary approaches, such as lifestyle and fitness behaviors. By starting with a "blurring of lines", as it were, and striking a balance between palliative and preventive approaches, a greater percentage of our society may be willing to embrace change.

Physician, Heal Thyself… In The Gym

In an ideal world, physicians would employ the psychology-related approach of modeling. Knowing that his doctor practices the habits of regularly exercising, making healthy food choices and adopting a lifestyle geared toward longevity, a patient may be more willing to take the steps necessary to shift his own lifestyle.

While this ought not be a utopian fantasy, doctors and nurses have become programmed to believe that in order to legitimatize their profession and ensure its continuity, they must rely upon unhealthy individuals, being heavily influenced by the giant pharmaceutical industry. After all, if everyone remains healthy, might there no longer be a need for conventional medicine?

An Imperfect Yet Improved System

Our society is far from allowing that to happen. While a majority of chronic health conditions may be prevented and attenuated by incorporating exercise and prudent nutrition into one's daily regimen, the truth is that there are conditions which we simply cannot prevent in the gym.

We can do our part to strengthen our immune systems, but bacteria and virus particles still exist in the air we breathe, and preservatives are still present in many grocery items. In addition, genetics exerts a powerful pull, regardless of our lifestyles. The best we can do for our population is to reach underserved areas, promote education about lifestyle change, and encourage those in the medical profession to model good practices for their patients.

Joy Prouty, a Reebok Master Trainer and fitness studio owner, weighs in with her ideas on this topic: "To motivate inactive people, health/fitness professionals should think outside the box and outside the walls of the health club. Get out into the community and get people moving.

There are lots of programs going on in community centers, retirement homes, youth centers, malls, parks, and recreation facilities." For as many of us that are already serving these demographics, there are an equal number of medical professionals who are unaware of such goings-on and their potential to help patients.

Taking steps to inform such individuals can propel fitness well into the next few decades. We can create flyers to leave in doctors' waiting rooms, conduct lunch-and-learn seminars and exercise programs, and solicit doctors and nurses to actively participate in fitness health fairs.

Carol Kennedy, a faculty member in the Fitness Specialist Curriculum at Indiana University, shares her ideas on the future of fitness in general: "Professionalizing the field of health and fitness is a critical issue. There are many certifications/credentials that health/fitness professionals can acquire.

There also are many different curricula in higher education that teach various skills to health and fitness professionals. Until organizations work together for the greater good - certification, credentialing and education will remain inconsistent. Organizations that educate, certify, and credential health/fitness professionals must be willing to work together rather than compete so that one standard can be adopted".

By integrating our professionals into the medical arena and working alongside such specialists as physical/occupational therapists, orthopedists, and even psychiatrists, we can share knowledge of the role fitness can play in preventive healthcare.

Facilitators of the Future

Do we dare to conceive of a society where the posture of senior adults is upright and pain-free, where asthmatic teens breathe more easily, where Pilates is a prescription for treating depression? It is possible! Fitness professionals, as well as those in the medical field, must find a path they can navigate together, with the same common goal of preventing rather than medicating our population.

Have you experienced success in training a client with a chronic condition? How did the condition improve? Share your insight with us!

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Assessing Cardiovascular Risk with Fitness Clients

Prioritizing and investigating clients' health history according to recent research and recommendations to minimize risk and identify potential unknown risk factors is part of the role of a personal trainer.

As with any physical activity, there's a risk of injury or – in very rare cases – a catastrophic outcome.

Here's what you need to know when gathering critical health information.

Pre-participation Health-Screening Guidelines

In November 2015, The American College of Sports Medicine (ACSM) updated the pre-participation health-screening guidelines in an effort to remove excessive medical barriers to participating in physical activity.

In November 2015, The American College of Sports Medicine (ACSM) updated the pre-participation health-screening guidelines in an effort to remove excessive medical barriers to participating in physical activity.

While the previous CVD risk factor algorithm was thorough, it was also complicated and left fitness professionals frequently making an unwarranted number of referrals clients to physicians for medical clearance. Research has questioned the effectiveness of the former screening tool.

A study by Whitfield, Gabriel, Rahbar, and Kohl (2014) suggested that greater than 90% of adults 40 years and better would receive a recommendation for physician clearance prior to beginning any exercise regimen. That's a staggering number of clients who want to be active only to become derailed or discouraged by a potentially unnecessary extra step.

Consequently, this created excessive medical barriers for clients (Whitfield, Riebe, Magal, & Liguori, 2017). To remedy this issue, a new algorithm was developed. Initial research results demonstrated that the number of individuals who would, under the previous guidelines, be referred to a physician for clearance decreased by 41% with the new guidelines (ACSM, 2018).

Another great benefit of the new screening approach is that it places more responsibility upon the medical professional to decide who needs what type of test and why thus taking the guesswork out of screening by personal trainers. All the exercise professional needs to do is use the updated algorithm and make the referral for medical clearance where necessary. Features of the new screening tool

Features of the New Screening Tool

According to research, the new tool and the need for medical clearance prior to beginning an exercise program is based on the following variables.

- An individual's current exercise participation
- History of cardiovascular, metabolic or renal disease or signs or symptoms suggestive of disease
- Desired exercise intensity of the client

(Riebe, Franklin, Thompson, Garber, Whitfield, Magal, & Prescatello, 2015).

The first step in using the new tool is to identify those individuals who do or do not participate currently in exercise. The goal is to more accurately and clearly classify individuals who are simply unaccustomed to activity from those who may legitimately be at risk for cardiac complications.

Next, depending on the category (currently active or inactive), personal trainers will use one of two flow charts. There are three categories on each chart for the two classifications of individuals. Each category is detailed in the charts and directs the trainer to proceed accordingly.

View the Chart from ACSM in this article

For example, if a client who **does not** participate in regular exercise and **has known** cardiovascular, metabolic, or renal disease **AND** he or she is **asymptomatic** (the second category under the "does not participate in regular exercise" classification), medical clearance is recommended.

Then, following medical clearance, the client can participate in light to moderate intensity exercise. The client can progress as tolerated using the ACSM guidelines.

A second example. If a client who **does** participate in regular exercise and **has known** cardiovascular, metabolic, or renal disease AND he or she is **asymptomatic** (the second category under the "does participate in regular exercise" classification), medical clearance for moderate intensity exercise is not necessary.

However, there is a caveat for vigorous exercise. Medical clearance (within the last 12 months if no change in signs/symptoms) is recommended before engaging in vigorous intensity activity.

Personal trainers should review and learn how to apply the newly developed guidelines and algorithm with their clients. It's also important for trainers to continue to monitor their clients for any changes that may affect the client's original classification. Signs and symptoms may develop and would, therefore, require a more aggressive analysis of risk by a qualified medical professional. Consult ACSM's Guidelines for Exercise Testing and Prescription (10thedition).

Signs and Symptoms

According to ACSM, major signs and symptoms that suggest possible cardiovascular, metabolic, and renal disease include:

- Pain or discomfort in the chest, neck, jaw, arms, or other areas that may result from ischemia
- Shortness of breath at rest or upon mild exertion
- Dizziness or syncope
- Orthopnea or paroxysmal nocturnal dyspnea
- Ankle edema
- Palpitations or tachycardia
- Intermittent claudication
- Known heart murmur
- Unusual fatigue or shortness of breath with usual activities

If a client displays or develops any of the above signs or symptoms, refer him or her to a qualified medical professional.

Self-guided Screening

In addition to the systematic process in place for determining a need for medical clearance, any individual wanting to start an exercise program can use the newly updated PAR-Q+ form. This version now includes multiple follow-up questions to better inform preparticipation decisions and risk.

Personal trainers can and are encouraged to use this tool as a supplement to other screening forms and protocols (ACSM, 2018). When it comes to client health history and current physical status, the more information the better.

A substantial body of research indicates the benefits of participating in regular physical activity far outweigh the potential risks. Fitness professionals who thoroughly comprehend and evaluate a client's risk factors serve to further enhance the known benefits of living an active lifestyle.

Resources

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Understanding and Training Pectoralis Major

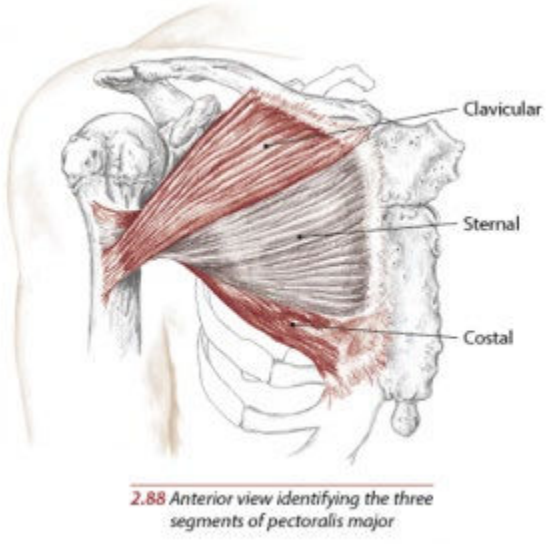
Knowing where pectoralis (pec) major is located, how it moves the surrounding bones and what exercises strengthen it is essential for exercise programming. Pec major is a large muscle in the upper body that influences shoulder movement, upper torso function, and breathing.

Most personal trainers and clients have an idea of where pec major is (compared to obturator internus). **Understanding pec major beyond its basic location and mainstream function will set you apart as a personal trainer.**

Let's dive in and explore!

Pectoralis Major Location

Use these directions to find the attachment points on yourself and connect to where pec major attaches. Flex (raise forward) and adduct (move toward the midline) your arm while you palpate to feel the muscle contract and locate the attachments. Lying supine on a mat or table will help you locate this muscle the most accurately.



2.88 *Anterior view identifying the three segments of pectoralis major*

Origin: Medial half of clavicle, sternum, and cartilage of ribs 1-6.

- Find your sternum in the center of the upper chest and palpate to the side of it until you feel your ribs meeting it.
- Contracting your pec major by protracting your shoulder forward will cause a contraction.
- Follow the sternal attachment superior (up) to the inferior (lower) clavicle and continue protracting to identify this portion of pec major.

Insertion: Crest of greater tubercle of humerus

- Find the pec major tendon in your armpit, it's a thick cord.
- Follow it to your anterior (front) armpit and onto your humerus bone.
- Pec's tendon dives below the bicep muscle onto the medial humerus. If you feel a nerve (stinging) sensation, be gentle and work around it - you are close.

Pectoralis Major Action

- Adducts the glenohumeral joint (GH) (shoulder)
- Flexes the GH joint
- Internally (medially) rotates the GH joint

To explore these actions, identify the origin sites of pec major again and perform each action independently. You'll feel the muscle tighten under your fingers as you move.

If you perform all three of these actions simultaneously pec major may feel like it's contracting more strongly and completely.

Pectoralis Major Exercises

Any exercise that calls upon one of the actions mentioned above will recruit the pectoralis major into action. If you do an exercise combining all three actions it maximizes the potential for this muscle to contract.

- Chest press - unilateral or bilateral
- Push up
- Plank - forearms or hands
- Chest fly - unilateral or bilateral
- Front shoulder raise - unilateral or bilateral
- Adduction pull down (pull a cable down to hip from the side) - unilateral or bilateral
- Lat pull down
- Chin up and pull up
- Punch (boxing) - unilateral or bilateral

Pectoralis Major Stretches

To stretch the pectoralis major, perform the opposite movements of its action. If stretches cause too much discomfort, do one reverse action at a time. **For maximal stretch perform all of the antagonistic motions together.** If there is pain when stretching - for you or clients, consult with a physician.

Antagonistic (opposite) actions for stretching

- Abduct the glenohumeral joint (GH) (shoulder)
- Extend the GH joint
- Externally (laterally) rotate the GH joint

Try these stretches

- Doorway stretch - place the palm in a doorway and walk forward slowly until a stretch is felt
- Foam Roller stretch - lying on a foam roller and spreading the arms wide out to the side and externally rotating
- Hands behind head stretch - place hands both behind the head and gently press the elbows back

Pectoralis Major Discomfort and Posture

It is common for people to sit with rounded shoulders and recruit pectoralis major more than it's antagonistic muscles (latissimus dorsi, rhomboid, trapezius). This doesn't necessarily mean pectoralis major is stronger than the other muscles.

It is important to train both sets of muscles as equally as possible. From there, the rest of this "poor posture" issue is often body awareness related. Teaching clients to have good posture and carry the body with optimal alignment is a big part of the puzzle.

Pectoralis major is a dynamic and multi-function muscle. Identifying the attachments of origin and insertion enhances body awareness, which can increase performance and decrease the risk of injury.

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Fun Functional Movement for Young Clients with Limb Weakness

Lower limb weakness can present in young people who are diagnosed with muscular dystrophy, multiple sclerosis, or cerebral palsy. Regardless of its etiology, lower limb weakness in adolescents can be improved through prudent and creative strength movements.

As athletes and personal trainers, we are quite familiar with the sensation of weakness in our limbs. It typically follows an intense quadriceps workout, rendering one feeling as if his legs were made of Jell-O. Knowing that this will pass within 24 hours, it is not given a second thought. However, the sudden onset of such weakness in an otherwise healthy child can be both confusing and frightening for parents.

What is Lower Limb Weakness?

Weakness in the limbs and even polio-like paralysis are frequently the first signals parents observe in children with no underlying comorbidity. Recently, isolated cases of a disease known as acute flaccid myelitis, or AFM, have medical professionals concerned and a bit confounded. The Centers for Disease and Control consider it a rare but potentially serious condition that mainly hits children, affecting the general nervous system, specifically the spinal cord.

Although not yet definitively proven, many research scientists believe the antagonist associated with AFM is the enterovirus EV-D68. 362 cases of AFM were reported to the CDC between 2014 and 2018. According to Dr. Kevin Messacar, an Infectious Disease specialist at Children's Hospital Colorado, "We don't yet have any effective treatment for the virus or for the condition. But we do know that over time, with rehabilitation therapies, many of the children can regain function."

Responding to the Need

Recently an inquiry was sent to NFPT regarding just such an adolescent. The writer, a personal trainer, shared this:

I have a young boy who has a situation that has been plaguing many young children lately and is acting similarly to polio. Weakening appears especially in the arms and legs and occurs out of the blue.

I have successfully trained clients with cerebral palsy and Parkinson's as well as other infirmities. My question is: Can I slowly proceed in helping this boy of 11 years old with these same types of strengthening exercises, progressing as he gets stronger?

Realizing that this might not be an entirely isolated situation, we chose to address limb weakness in general for purposes of educating trainers and opening the door for an even more diverse clientele. For children who present with weakness in their extremities, strengthening exercises have proven beneficial for long-term functional gains, improved movement patterns, and optimal posture.

When limbs are lacking in strength (power), muscular endurance follows suit. With a dramatically lowered work capacity, the individual ends up expending a greater amount of energy simply to move.

Addressing and Improving Patterns of Movement

During the course of normal adolescent development, core strength builds through regular practice of active movements as well as those working against gravity. A child will practice small components of a movement pattern before using the pattern functionally.

To illustrate this point, we can think of a toddler who progresses from crawling to standing, and finally to walking and running. Children living with limb weakness, unfortunately, end up cultivating a limited repertoire of movement patterns. If we think of how an adult learns to strategize movement with an injured leg or a limp, we can begin to comprehend how a child with limb weakness develops compensatory movements.

While this may at first seem to functionally serve the child, his rapidly developing body ends up with decreased strength and endurance of his key muscle groups.

We can learn much about this realm of training by studying the approaches of professionals, both medical and therapeutic, in treating adolescents with cerebral palsy. Resistance training has shown great promise toward developing strength and skill in these children for over 50 years. Quantitatively, children with cerebral palsy exhibit significantly more weakness than their healthy peers; however, with proper training, their strength can approach near normal values.

Since young children learn best when they are having fun, strive for creative and playful limb strengthening when designing workout sessions. Exercises that mimic animal movement are a sure-fire way to begin.

Exercises to Implement

Duck walks build total leg strength and flexibility. Help the child stand with feet shoulder-width apart and squat down with his butt lower than his knees. Strive to maintain an upright torso and low butt as he takes small steps forward. After mastering this technique, prompt him to try stepping backward in the same position.

Frog jumps are another great animal exercise that encourages the development of leg strength and agility. Learning to jump and land correctly (with bent knees) helps to prevent injury.

It may be a good idea to demonstrate this exercise before having a client attempt it. Starting with feet shoulder-width apart, squat down, keeping the torso erect. Proceed to jump up, extending at the hips and knees as you propel yourself forward. Land with both feet flat and the knees bent, in preparation for the next jump.

Wall sits strengthen the hips, gluteals, and quadriceps, but from a young person's perspective, they offer nothing in the way of creative entertainment. Set a time challenge for a young client; older clients may find a competition between you and him more fun and motivating. Playing a game of catch with a lightweight medicine ball while the client performs a wall sit can help distract him as he aims to complete the time challenge.

With back against a wall, walk feet out in front of body, positioning them shoulder-width apart. Slide down the wall until thighs are parallel with the ground. Make sure knees are aligned over the toes and hold.

Strengthening the calf muscles by working from tiptoes can help a child cultivate balance and agility, key components that compliment leg strength.

Mark out a straight linear path on the gym floor with masking tape. Instruct the client to rise up on tiptoes walk along the line without stepping outside or dropping down to the soles of the feet. Once this level has been successfully accomplished, try moving on to shapes or curvy patterns.

Compound Movements

There are a number of simple functional movements and activities that are not only creative but can be used to strengthen more than one area of a client's weak limbs. Below is a list that includes movements commonly performed throughout a typical day. Some of the movements are added for the sake of keeping the workout fun and interesting.

- Playing catch with a medicine ball, moving the location and level from which the ball is thrown
- Rolling or crawling up and down incline planks
- Kicking backward in an attempt to knock over objects
- Climbing activities on stairs
- Backward walking through an obstacle course
- Karate kicking at a bolster
- Sidestepping on a balance beam

If you happen to be working with a group of young people, all of whom have varying degrees of the same limb weakness, plan relay races while holding a balloon or small ball between the legs.

Start With The End In Mind

Whether you are a personal trainer or a parent, helping children with limb weakness cultivate body strength can be accomplished in a safe manner. It is important to keep in mind that strength- training exercises should never be performed with a goal of building bulky muscles.

The focus should remain on technique and having fun while attempting to elevate endurance and work capacity. Enabling a young person to move more comfortably through activities (and play) encountered daily can have a tremendously positive effect on his overall outlook while helping him establish successful and stronger movement patterns for his future growth and development.

How have you successfully trained special populations of young clients?

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SELF-TEST: December 2018

1. Which of the following is a true statement?
    a. Those with Down Syndrome tend to exhibit 40-50% less strength than their healthier counterparts
    b. Those with Down Syndrome tend to exhibit 40-50% more strength than their healthier counterparts
    c. There are no strength differences between those with Down Syndrome and their healthier counterparts
    d. No study has been to examine the strength differences

2. In the 10 week trial of 12 Down Syndrome subjects, which of the following is true?
    a. The 3 upper body exercises showed an average strength increase of 42%
    b. The 3 lower body exercises showed an average increase of 90%
    c. Both a and b
    d. Neither a nor b

3. Which of the following is a benefit of strength training?
    a. Improvements in digestive and immune system function, blood pressure and bone density
    b. Confers some protection against diabetes, obesity, heart disease, osteoporosis and certain types of cancer
    c. Sleep patterns are greatly improvements
    d. All of the above

4. The number of individuals 65 or older is expected to _____ by the year 2060?
    a. Stay the same
    b. More than double
    c. More than triple
    d. Decrease by half

5. What has the most significant impact on improving the quality of life of our aging population?
    a. Cardiovascular activity
    b. Strength training
    c. Nutrition
    d. All of the above

6. Which best describes an Olympic Triathlon?
    a. .5 mile swim, 12.4 miles on a bike, and a 3.1 mile run
    b. .93 mile swim, 24.8 miles on a bike, and a 6.2 mile run
    c. 1.2 mile swim, 56 miles on a bike, 13.1 mile run
    d. 2.4 mile swim, 112 miles on a bike, 26.2 mile run

7. In Tri training, what is known as a “brick session”?
    a. Training all 3 activities back to back to back
    b. Training 1 activity every day
    c. Training 2 of 3 activities back to back
    d. None of the above

8. How many people in the United States suffer from Peripheral Neuropathy?
    a. 5 million people
    b. 10 million people
    c. 15 million people
    d. 20 million people

9. Which of the following is NOT a risk factor for developing Peripheral Neuropathy?
    a. Diabetes Mellitus
    b. Repetitive motion tasks
    c. Family history of neuropathy
    d. Obesity

10. What causes a torn meniscus?
    a. Acute trauma
    b. Degeneration of the knee joint
    c. Both a and b
    d. Neither a nor b

11. What is the most common meniscus tear?
    a. Longitudinal tear
    b. Bucket handle tear
    c. Flap tear
    d. Transverse tear

12. What type of a joint is the knee?
    a. Synovial
    b. Fibrous
    c. Cartilaginous
    d. None of the above

13. Which is the strongest ligament and stabilizer of the knee?
    a. LCL
    b. MCL
    c. ACL
    d. PCL

14. Which type of cartilage covers the end of the femur, tibia and fibula?
    a. Hyaline
    b. Menisci
    c. Fibro
    d. Elastic

15. In stress urinary incontinence, what becomes weak?
    a. Pelvic muscles
    b. Abdominal muscles
    c. Bladder
    d. Bowels

16. Which type of activities can exacerbate stress incontinence?
    a. Volleyball
    b. Gymnastics
    c. Heavy weight lifting
    d. All of the above

17. Which of the following does corporate wellness NOT take into account?
    a. Ergonomics
    b. Education
    c. Sleep
    d. Hygiene

18. Which is NOT a trend outlined by Forbes that will impact employee wellness programs?
    a. An emphasis on mental health
    b. Make it a complex approach
    c. Focus on sleep
    d. Healthy vending machines

19. Autophagy translates from Greek as:
    a. Eating of self
    b. Regulating of self
    c. Balancing of self
    d. None of the above

20. Autophagy makes us more efficient machines by:
    a. Stopping cancerous growths
    b. Stopping metabolic dysfunction like obesity and diabetes
    c. Both a and b
    d. Neither a nor b

21. Which fasting approach seems to resonate more easily with the majority of the population?
    a. 24 to 36 hour fast a few days a month
    b. the 5:2 plan
    c. 7 days fasting 7 days off approach
    d. 12 hours on/12 hours off approach

22. During a fast, the majority of energy is directed at:
    a. Digestion
    b. Eliminating toxins and healing
    c. Sleeping
    d. Exercise

23. Over the last 10 years, the population of children with special needs has:
    a. Stayed the same
    b. Decreased by 20%
    c. Increased by 165%
    d. Increase by 20%

24. Which of the following is a benefit of exercising for children with special needs?
    a. Strengthens the immune system
    b. Controls weight
    c. Builds muscle
    d. All of the above

25. Exercise is a great way to burn off excess nervous energy in non-verbal children which can improve:
    a. Nutrition
    b. Calm attention
    c. Sleep
    d. Balance

26. What can bring on epilepsy?
    a. Head trauma
    b. Stroke
    c. Tumors
    d. All of the above

27. Epileptic subjects who participated in 60 minute sessions of aerobic exercise, twice weekly, reported:
    a. A significant reduction in seizures
    b. More seizures
    c. Sleeplessness
    d. Depression

28. When preparing a workout for epileptic clients, a great starting point is:
    a. Contact sports
    b. Activities such as rock climbing
    c. Supervised strength training
    d. Long distance running

29. If oxygen levels decrease too dramatically, in an attempt to coerce the lungs to perform, recruitment of which muscles occur?
    a. Muscles in the neck
    b. Muscles in the shoulders
    c. Both a and b
    d. Neither a nor b

30. What should NOT be included in program design for clients with COP?
    a. Lifting heavy weights
    b. Push ups and sit ups
    c. Isometric exercises
    d. All of the above

31. Which of the following is NOT one of the five major chronic conditions afflicting today's population?
    a. Cancer
    b. Heart disease
    c. Stroke
    d. Diabetes

32. In the 'Tiers of Treatment', prevention is the focus. This tier's main focus is reducing the recurrence of chronic conditions and to treat/mitigate complications once such diseases become acquired.
    a. First
    b. Second
    c. Third
    d. Fourth

33. Under the new CVD risk factor algorithm, the number of individuals who would have been referred to a physician, but now do not, has:
    a. increased by 90%
    b. decreased by 90%
    c. increased by 41%
    d. decreased by 41%

34. Which of the following is NOT a major sign or symptom that suggests possible cardiovascular, metabolic, and renal disease?
    a. Ankle Edema
    b. Dizziness
    c. Shortness of breath
    d. Obesity

35. Where is the insertion point of the pectoralis major?
    a. Medial half of clavicle
    b. Crest of greater tubercle of humerus
    c. Anterior side of glenohumeral joint
    d. Center of the sternum

36. What action does the pectoralis major perform?
    a. Adducts the shoulder
    b. Flexes the shoulder
    c. Neither of these
    d. Both of these

37. What does the acronym 'AFM' stand for and which system does it primarily effect?
    a. Acute Flaccid Myelitis; the nervous system
    b. Abrupted Failing Musculature; the muscular system
    c. Abnormal Fasciitis Malady; lymphatic system
    d. Abiotic Fava Marker; digestive system

38. What demographic does AFM effect most?
    a. Young Adults
    b. Children
    c. Elderly
    d. Anyone with a current medical condition

39. Which of the following is a good functional exercise for limb weakness?
    a. Duck Walks
    b. Frog Jumps
    c. Karate Kicks
    d. All of these are good for limb weakness

40. To cultivate body strength in individuals with limb weakness, strength training should be incorporated into the program.
    a. Yes
    b. No

SIDE 1

○ RESCORE ○ MARK ✓ ○ TOTAL ONLY/BOTH SIDES

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1	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
2	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
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24	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
25	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ

	T	F
26	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
27	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
28	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
29	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
30	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
31	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
32	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
33	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
34	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
35	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
36	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
37	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
38	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
39	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
40	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
41	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
42	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
43	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
44	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
45	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
46	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
47	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
48	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
49	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ
50	Ⓐ	Ⓑ Ⓒ Ⓓ Ⓔ

KEY ITEM COUNT

0	0	0
1	1	1
	2	2
	3	3
	4	4
	5	5
	6	6
	7	7
	8	8
	9	9

1 FEED THIS DIRECTION

NFPT ID

0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9

MARKING INSTRUCTIONS

Use a No. 2 Pencil

Ⓐ ● Ⓒ Ⓓ Ⓔ
Fill circle completely

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
Erase cleanly

SCORE		# CORRECT
		% CORRECT
RESCORE		# CORRECT
		% CORRECT
ROSTER NUMBER		SCORE
		RESCORE

NAME _____

SUBJECT **DEC 2018 CEC Self Test**

PERIOD _____ DATE _____

Trans-Optic® forms by NCS Pearson MM19641-2 654321

TEST ANSWER SHEET B
Form No. 19641

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